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THE

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AND OF THE

INSTITUTIONS IN UNION.

VOLUME XI.

FROM NOVEMBER 21, 1862, TO NOVEMBER 13, 1863.

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No. 522. FRIDAY, NOVEMBER 21, 1862. Vol. XI.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 21, 1862.

INTERNATIONAL EXHIBITION of 1862.

REPORTS OF THE JURIES.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s.; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

The reports of each class are sold separately; for prices see advertisement.

EXAMINATIONS, 1863. — NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The attention of Secretaries of Institutions and Local Educational Boards is specially called to the following extract from the programme of examinations for 1863:—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1863. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Whenever this is the case, the names and addresses of the members, both of District Board and of its Branch Boards must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

FIRST ORDINARY MEETING.

Wednesday, November 19th, 1862.

The First Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 19th inst., Sir Thomas Phillips, F.G.S., Chairman of the Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Abbott, Maj.-Gen. Sir Frederick, C.B.	73, Inverness-terrace, Kensington-gardens, W.
Ackland, William	121, 122, and 123, Newgate st., E.C.; and 19, Church row, Newington Butts, S.
Ainsworth, Samuel	(James Carter and Co.), High Holborn, W.C.
Aldebert, Isaac	57, Long-acre, W.C.
Allan, Alexander	Locomotive Department, Scottish Central Railway, Perth.
Allan, John	2 and 3, St. Paul's Churchyard, E.C.
Allen, Henry	17, Percy-street, Bedford-square, W.C.
Andrew, Fred. Wm.	3, Neville-terrace, Queen's Elm, S.W.
Ashworth, Taylor	The Grove, Hanley, Staffordshire.
Atkinson, J. Beavington	Rosehill, Cotham-park, near Bristol.
Atkinson, Richard	31, College-green, Dublin.
Austin, James	8 and 9, Princes-street, Finsbury, E.C.
Baiss, William Arnold	Denmark-hill, S.
Baldock, William	Grove-cottage, Putney, S.W.
Barron, E. C.	The Lodge, Chingford, Essex.
Barron, W. J.	The Lodge, Chingford, Essex.
Barry, Dykes	4, Buckland-crescent, Belsize-park, St. John's-wood, N.W.
Barry, John George	Meriton's Wharf, S.E.
Barry, Sir Redmond	Carlton-gardens, Melbourne, Victoria.
Bedford, Francis	23, Rochester-road, Camden New-town, N.W.
Bell, Thomas	Broadway-house, Plaistow. E.
Benson, James William	33 and 34, Ludgate-hill, E.C.
Betts, Rev. Robert Wye	Lyndhurst-road, Peckham, S.
Bevan, Henry	St. Mary's-street, Shrewsbury.
Birrell, George	Dunfermline, N.B.
Bolckow, Henry	Marton-hall, Middlesbro'-on-Tees.
Booth, H. C.	Harrogate.
Borwick, George	21, Little Moorfields, E.C.
Bradbury, Thomas	Longroyde, Brighouse.
Bradbury, William	40, St. John's-park-villas, Haverstock-hill, N.W.
Brady, George	Winchelsea-lodge, near Ilford.
Brassey, Thomas, jun.	Beaufort, Battle, Sussex; and University Club, Suffolk-street, S.W.
Bretnall, T. D.	24, Huntley-street, Tottenham-court-road, W.C.
Brooks, S. A.	10, Northampton-square, E.C.
Broomhall, J.	Manor-st., Old Kent-rd., S.E.
Brothers, A.	14, St. Anne's-sq., Manchester.
Buckwald, C.	12, Old Quebec-street, W.
Burgoyne, Gen. Sir John Fox, Bt., G.C.B., F.R.S.	8, Glo'ster-gardens, Paddington, W.
Caslon, Henry William	22, Chiswell-street, E.C.
Clark, Gordon Wyatt	72, Great Tower-st., E.C.; & Chessington, Surrey, S.W.
Clarkson, Thos. Charles	56, Stamford-street, S.
Clarkson, Wm. Watts	Narborough-road, Leicester.
Coathupe, Captain H. B.	1, Abingdon-terrace, Kensington, W.

Cole, James Ferguson	11, Great James-street, Bedford-row, W.C.
Collins, Hyman Henry	61, Torrington-square, W.C.
Cooper, Miss Adeline M.	78, Coleshill-street, Eaton-square, S.W.
Cooper, William	42, Brompton-row, S.W.
Cope, Walter	17, Terrace, Camberwell, S.
Cowan, Thomas William	Kent Iron Works, Bridge-street, Greenwich, S.E.
Curzon, Hon. Robert	24, Arlington-street, S.W.
Dawson, A.	Kingston-on-Thames, S.W.
De la Grangerie, Chevalier Dardenne	Rue Chalot, 76, Paris.
De L'Isle, Lord	Penshurst, Kent; and Ingleby Manor, Northallerton, Yorkshire.
Denman, Lord	28, Sackville-street, W.; and Middleton, Sheffield.
Dickes, William	Clarendon - villas, Loughborough-park, Brixton, S.
Dobson, Christopher Terry	13, Foxley - road, North Brixton, S.
Doubleday, H.	Coggeshall.
Dowleans, A. M.	Malvern - villa, Eldon - road, Victoria-road, Kensington, W.
Duncan, Charles Stewart	9, Inverness-terrace, W.
Duncum, Chas.	17, Wigmore-street, W.
Dunville, William	Richmond-lodge, Belfast.
Earp, Thomas	1, Kennington - road (near Female Orphan Asylum), Lambeth, S.
Eastham, John	Moorfield-villa, Halifax.
Eddy, C. W.	8, Warwick-terrace, Belgrave-road, S.W.
Edmands, Thomas Herbert	29, St. George's-square, Regent's-park, N.W.
Edwards, Richard	Dale-hall, Burslem, Staffordshire.
Ellis, Charles	21, Bedford-street, Covent-garden, W.C.
Ernst, F. Gustav	19, Calthorpe-street, W.C.
Evrard, Jean	35, Charles-street, Middlesex Hospital, W.
Falcke, David	Sutherland-house, Great Yarmouth.
Fetherston, John J.	18, Suffolk-street, Dublin.
Fryer, Henry	1 and 2, Gray's-inn-place, Gray's-inn, W.C.
Foley, Lord	26, Grosvenor-square, W.; and Worksop Manor, Nottinghamshire.
Forster, John	Denmark-hill, S.
Forsyth, James	8, Edward-street, Hampstead-road, N.W.
Foveaux, Joseph Franz	62, Strand, W.C.
Geeves, William	Caledonian Sawing and Planing Mills, New Wharf-road, Caledonian-road, N.
George, Francis	5, Sise-lane, E.C.
Ghislin, Thomas Goulston	72, Hatton-garden, E.C.
Gisborne, F. N.	3, Adelaide-place, London-bridge, E.C.
Goding, Charles	13, St. George's-place, Hyde-park-corner, S.W.
Goding, William	13, St. George's-place, Hyde-park-corner, S.W.
Gonzaga, H. S. H. the Prince Alexander of, and Duke of Mantua	11, Charles-street, Manchester-square, W.
Goodall, Josiah	12, Great College street, Camden-town, N.W.
Grant, George	National Boat-building Company, 123, Fenchurch-st., E.C.
Gresley, Thomas	Cauldwell-hall, Burton-on-Trent.
Guillaume, Charles	16, Myddelton-square, E.C.
Hall, Charles Godfrey	89, Quadrant, Regent-street, E.C.
Hamilton, Capt. Henry George, R.N.	71, Eccleston-square, S.W.
Hancock, Henry	37, Harley-street, W.
Harnett, William	12, Panton-square, Coventry-street, W.
Harvest, D.	Dowgate Dock, Upper Thames-street, E.C.
Harvey, Alexander	Govanhaugh, Glasgow, N.B.
Headland, Edward	6, Upper Portland-place, W.
Heath, Robert	25, St. George's-place, Hyde-park corner, S.W.
Heathorn, Captain Thos. Bridge	Royal Artillery Barracks, Sheerness.
Herdman, William G.	West Villa, Everton, Liverpool.
Heywood, Edwin	Halifax.
Higgs, Samuel, jun.	Penzance.
Hill, Lord A. Edwin, M.P.	24, Belgrave-square, S.W.
Hodgkinson, Francis O.	161, New Bond-street, W.
Honeyman, Rev. D., F.G.S.	Nova Scotia.
Horwood, H. J.	36, Albert-street, Regent's park, N.W.
Howard, Thomas	King and Queen Iron Works, Rotherhithe, S.E.
Hutchins, William	8, Croom's-hill, Greenwich, S.E.
Jackson, Samuel	Bradford.
Jecks, Isaac	Great Yarmouth.
Jeffrey, John	61, Charlotte-street, Portland-place, W.
Johnson, Colonel B. P.	Corresponding Secretary, New York State Agricultural Society, Albany, New York, U.S. America.
Johnston, James	Newmill, Elgin, N.B.
Keeling, Herbert Howard	King and Queen Iron Works, Rotherhithe, S.E.
Kershaw, William	Suffolk-lodge, Brixton-road, S.; and 16, St. Mary Axe, E.C.
Key, John	White Bank Engine Works, Kirkcaldy, N.B.
Kindon, Charles	Swan-street, Old Kent-road, S.E.
Knott, J. H.	Prospect-cottages, Roehampton, S.W.
Kullberg, Victor	12, Cloudesley-terrace, Islington, N.
Land, John	94, Cannon-street, E.C.
Langdale, E. F.	72, Hatton-garden, E.C.
Lazard, Edward	46, Gloucester-crescent, Hyde-park, W.; and 11, Moorgate-street, E.C.
Lea, Charles James	High-street, Lutterworth.
Leak, Abraham	132, Piccadilly, W.
Legg, Thomas Rowland	11, Croom's-hill, Greenwich, S.E.
Lenthall, Henry	222, Regent-street, W.
Letchford, R.	Three Colts-lane, Bethnal-green, N.E.
Lillicrapp, W. P.	19A, Davies-street, Berkeley-square, W.
Litchfield, Samuel	19, Green-street, Leicester-square, W.C.
Longbottom, John, Jun.	Osmondthorpe-hall, Leeds.
Lovegrove, James, C.E.	Pembury-lodge, Dalston-rise, N.E.
Lutley, James	Queen's road, Brighton.
Maclean, T. M.	26, Haymarket, S.W.
Mann, Aldridge	122, Holborn-hill, E.C.

Marsden, W. J.	Upper Thorpe-road, Sheffield.
Martin, Thomas	22, Stock Orchard - villas, Caledonian-road, N.
Martin, W. A., C.E.	55, Great Sutton-street, E.C.
May, Harry	9, Gloucester-grove West, Brompton, S.W.
McCallum, D.	1, Octagon, Union-road, Plymouth.
McClure, Andrew	Walbrook, E.C.; & 14, Ladbroke-sq., Notting-hill, W.
McLennan, J.	6, Park-place, Highbury, N.
Miller, John	Sandland's Chemical Works, Aberdeen.
Moffat, Major A. Hay	65, Porchester-terrace, W.
Molineux, Thomas	37, John Dalton street, Manchester
Morewood, Edmund	Stratford, E.
Newth, Frederick	44, Percival street, Clerkenwell, E.C.
Nicholls, Henry	52, Regent-street, W.
Northcott, Edward	13, Rood-lane, E.C.
Odling, Anselm	6, Prince's-place, Kennington-road, S.
Oram, George	19, Wilmington-square, E.C.
Ormson, Henry	Stanley-bridge, King's-road West, S.W.
Oswald, Alexander Haldam	58, Green-street, Grosvenor-square, W.
Paine, Mrs. Caroline	Farnham.
Parkhurst, Rodie	7, Clarendon-terrace, Lewisham-road, S.E.
Partridge, Ebenezer	Whinfield Works, Smethwick.
Philp, Andrew Bell	10, Paradise-row, Stoke Newington, N.
Pooley, Henry, C.E.	Albion Foundry, Liverpool.
Power, Bonamy	19, Chesham-street, S.W.
Powis, Earl of, D.C.L.	45, Berkeley-square, W.; and Powis Castle, Welchpool.
Pugh, Edward	Bilston.
Pulham, James	Broxbourne, Herts.
Purling, Charles	150, Marylebone-road, N.W.
Ranwell, John Percival	1, Middleton-place, Stoke Newington-road, N.
Reed, William	5, Sumner-place, Onslow-square, S.W.
Revell, James	267 & 272, Oxford-street, W.
Ridley, Arthur S.	54, Gloucester-road, Regent's-park, N.W.
Robertson, Archibald	67, Gracechurch-street, E.C.
Robinson, John	Rochdale.
Rosher, F.	72, Mornington-road, Regent's park, N.W.
Rosher, George	54, Oakley square, N.W.
Roupell, Robt. P., Q.C.	13, Park-lane, Piccadilly, W.
Rumsey, W. S.	Derby-house, Clapham-rise, S.
Russell, Captain Godfrey	103, Albany-street, Regent's-park, N.W.
Russell, John	Risca-house, near Newport, Monmouthshire.
St. George, Brigadier-General, J.	17, Rutland-gate, S.W.
Sambrooke, Thomas	32, Eaton-place, S.W.
Samuelson, Martin	Scott-street Foundry, Hull.
Sax, Julius	8, Hatton-garden, E.C.
Schooling, Henry	2, Parkfield-villas, King Edward road, Hackney, N.E.
Scudamore, Frank Ives	Conduit-vale House, Blackheath, S.E.
Seaton, W.	44, Albemarle-street, W.
Sharman, Alfred	Mulberry-villa, Walham-green, W.
Skinner, H.	25, Coleman-street, E.C.
Smith, Henry	21, Duke-street, Edinburgh.
Smith, Robert	23, Fish-street-hill, E.C.
Spink, Daniel	Pyleigh, Bridgewater.
Stanley, W. F.	3 & 5, Great Turnstile, Holborn, W.C.
Stevens, John Robert	8, Delamere-terrace, Maida-hill, W.
Stodart, Mrs. Matilda	31, Cloudesley-terrace, Islington, N.
Stubbs, William	10, Elliott-street, Liverpool.
Sutton, Martin Hope, F.R.H.S.	Cintra-lodge, Reading.
Thompson, Joseph	Beach-grove, Bowden.
Thompson, Nathan	National Boat-building Company, 123, Fenchurch-st., E.C.
Truscott, Francis Wyatt	5, Suffolk-lane, Cannon-st., E.C.
Tueski Moritz Paul	King's Lynn, Norfolk.
Turner, W. Shearman	55, Old Broad-street, E.C.
Turney, J. G.	Shirley-villa, South Norwood, S.
Twelvetrees, Harper	Bromley, Middlesex, E.
Tyler, James W.	4, Wood street, Westminster, S.W.
Ullmer, Frederick	15, Old Bailey, E.C.
Usher, Rufus	Bodicott, Banbury.
Vickers, James	Woodlands, Tooting Common, S.
Vines, Richard	3, Great College-street, Camden Town, N.W.
Vogan, James	Mill Wharf, Mill-street, Bermondsey, S.E.
Ward, William A.	3, Belgrave-villas, Barrington-road, Brixton, S.
Watney, James, Jun.	10, Oxford-square, W.
Watts, Henry	31, Wellington-road, Stoke Newington, N.
Welton, Thomas	13, Grafton-street, Fitzroy-square, W.
Wesley, Erasmus M.	36, Great George-street, S.W.
Westley, Frederick Wm.	10, Friar-street, Doctor's-commons, E.C.
White, Frederick Meadows	5, Brick court, Temple, E.C.
White, George	Abbey-street Schools, N.E.
Whitehead, William	203, Western Bank, Sheffield.
Whitelaw, John	St. Clement's Wells, Musselburgh, N.B.
Whitmee, John, Jun.	70, St. John-street, E.C.
Widnell, Henry	Lasswade, near Edinburgh.
Wilford, John	Brompton, near Northallerton, Yorkshire.
Williams, W. E.	High-st., Wandsworth, S.W.
Wilson, Isaac Whitwell	Castle-lodge, Kendal.
Wilson, William	Fairbank-villa, Talfourd-road, Camberwell, S.
Young, William Martin	4, Warwick-crescent, Harrow-road, W.
Zaehnsdorf, Joseph	30, Brydges-street, Covent-garden, W. C.

AND AS HONORARY CORRESPONDING MEMBERS.

Altgelt, Regierungs-Rath A.	Prussian Commissioner for the International Exhibition of 1862.
Beeg, Dr. C.	Bavarian do.
D'Azeglio, His Excellency the Marquis.	Ambassador for Italy.
Del Campo, J. M.	Secretary of the Dutch Commission for the International Exhibition of 1862.
Devincenzi, Commendatore G., M.P.	Italian Commissioner for do.
Di Cavour, Marchese G. B., M.P.	Do do. do.
Dietz, Dr.	Commissioner from Baden for do.
Fortamps, Senator F.	Belgian Commissioner do.

Hoene, Geheimer-Ober-Regierungs-Rath	Prussian do.
Karmarsch, Dr. C.	Hanoverian do.
Koch, Herr	Secretary of Ministry of Commerce, Berlin.
Peterson, George	Russian Commissioner for the International Exhibition of 1862.
Sannicola, Le Chevalier Docteur Giovanni	Naples.
Tidemand, Emil	Norwegian Commissioner for the International Exhibition of 1862.
Villa Maior, Le Visct. de	Portuguese do.
Von Steinbeis, Dr.	Commissioner for Wurtemberg for do.
Waern, C. F.	Swedish Commissioner for do.
Wiessner, Regierungs-Rath M. L.	Saxon do.

The following Institutions have been taken into Union since the last announcement:—

Burgh Heath, near Epsom (Mr. Hudson's), Reading-room and Library.
Hull, Young People's Christian and Literary Institution.
Isle of Wight (Ryde), Philosophical and Scientific Society

The Chairman delivered the following

ADDRESS.

Having, in compliance with the unanimous desire of the Council, undertaken the duties of their Chairman for another year, I solicit your indulgence whilst for the fourth time I deliver the opening address of a Session.

It has been of late years the custom to bring under the notice of the Society, at the first meeting of the Session, the losses we have sustained in the removal from amongst us, by death, of men distinguished by their position or their services; but on no former occasion have we had, as we have now, to lament the loss of a member at once the highest in rank and foremost in usefulness—His Royal Highness the Prince Consort, who died at Windsor on the 14th Dec. last. His Royal Highness was elected President of this Society in 1843, and was ever ready to further its undertakings, not only by the influence of his exalted rank, but by (what we valued still more highly) wise counsel and judicious guidance. His distinguished position, his refined tastes, his enlightened judgment, his remarkable candour, his familiarity with general principles, his power of applying the deductions of science to the arts and employments of life, his singular administrative skill, and his special and accurate knowledge on a great variety of subjects, were so employed as widely to extend the influence, and greatly to promote the objects, of the Society. The Exhibition of 1851, with its manifold influences on the progress of industry and art, was the work of the Prince Consort, and in overcoming the difficulties of an undertaking so novel and vast, he solved the problem of conducting exhibitions, and those undertakings will be an enduring memorial of their author. At his last appearance in this room he occupied the chair, during the reading of a paper, on the International Exhibition of 1862, by my colleague Mr. Hawes; and he then assured us it was a real privation to him to be prevented, by the avocations and duties of his position, from being able to give the same amount of time and labour to that Exhibition that he was privileged to give to the Exhibition of 1851.

Soon after the death of His Royal Highness a public meeting was held at the Mansion-house to promote a memorial commemorative of his many virtues and expressive of the nation's gratitude, and to that memorial the Council voted the sum of 1,000 guineas, a contribution which was unanimously approved by the Society at a general meeting of the members. The subscriptions collected by the Mansion-house Committee having, for the most part, been limited to the wealthy classes, the Council of the Society, early in the month of April, recommended that suitable means should be taken to make known to the people generally, the character of the memorial which it was proposed to erect, and to afford to all classes of the community the opportunity to take a part, however humble, in what would thus become a national monument. A meeting of ladies and gentlemen desirous of promoting the proposed memorial was held in the Society's rooms, over which the Marquis of Salisbury, K.G., presided, when it was resolved that arrangements should be made to afford every one who desired it the opportunity of joining in the intended national memorial of affection and gratitude to the Prince Consort, and a Committee was appointed to give effect to the resolutions of that meeting. The appeal then made was extensively circulated, and through the instrumentality of that Committee a sum of nearly £10,000 has been collected, for the most part from the humblest classes of the community.

At a general meeting of the Society, held on the 21st March, the members expressed their further desire to mark their estimation of the great services rendered by His Royal Highness to the Society by having a special memorial for the Society; and the Council were requested to consider the most appropriate form of memorial, and bring the matter before a meeting of the members at a fitting time. The Council having considered the subject referred to them by the Society, recommend that the memorial shall consist of a marble bust of the Prince, to be placed on a suitable pedestal in this room, the cost being defrayed by the individual subscriptions of members, and that recommendation will be submitted to a general meeting of the members for their approval. The Council having anxiously considered the question by whom the office of President can be best filled, have already expressed their hope that His Royal High-

ness the Prince of Wales will honour the Society by accepting that office.

Meanwhile the members at the last annual meeting made a provisional arrangement by electing to the office of President, Mr. Tooke, the Senior Vice-President, and an old and tried friend of the Society.

Mr. James Walker, an old member of the Society and an eminent civil engineer, was born at Falkirk, in 1781, and, after receiving the rudiments of his education at the parish school of that town, completed his studies at the University of Glasgow, where he obtained much distinction; and where, in later years, he received the honorary degree of Doctor of Laws.

In the year 1800 he came to London, and entering upon the study of his profession under his uncle, Mr. Ralph Walker, acted as that gentleman's assistant in the construction of the West and East India Docks. In 1830 he was appointed engineer of the Commercial Road, and subsequently of the East India Road; and in the year 1806 he became Engineer of the Commercial Docks.

Mr. Walker succeeded Mr. Telford in many of the works of that eminent engineer, and among other important undertakings with which Mr. Walker was connected, may be mentioned the construction of Vauxhall Bridge over the Thames, and the Victoria Bridge over the Clyde; the improvements of the River Clyde; the repairs of the Caledonian and Crinan Canals; the Coffer Dam and River Wall of the New Houses of Parliament; extensive works on the Birmingham Canal, including the Netherton Tunnel; the Leeds and Selby and Hull and Selby Railways; the Pier and Harbour of Granton; the improvements of the Harbour of Belfast, and the construction of the Harbour Works at Dover; the designs for and execution of the Harbours of Refuge at Alderney, Dover, and Harwich; the Tyne Piers; the completion of Plymouth Breakwater; the foundation of the Fort about to be constructed at that place for the War Department; and the various Lighthouse Works of the Corporation of the Trinity House. As a difficult and successful work, the Bishop Rock Lighthouse, off the Scilly Islands, may be placed in the foremost rank of engineering skill with those of Smeaton, at the Eddystone; of the elder Stevenson, at Bell Rock; and of that built at the Skerryvore, by his son, Alan Stevenson.

The Corporation of London for many years consulted Mr. Walker on the various engineering works under their jurisdiction, among which may be named the City Sewers, the navigation of the River Thames, and last, although not the least important, the Thames Embankment, his lines for which are understood to have been adopted by the last commission. He had been largely engaged in extensive drainage operations in the fens, particularly in the Middle Level; and the magnitude of these operations, by which 90,000 acres of land were effectually drained, is well known. His works were remarkable for their solidity, permanency, and utility.

In habits he was strict and regular; he was eminently a man of business, and his character was marked by a practical sagacity which rendered him on all occasions a sound adviser. In 1834 he was chosen President of the Institution of Civil Engineers, and occupied that distinguished position until 1845.

Mr. Walker had been in the active exercise of his noble profession for a period of 60 years, and although in declining health for the last three years he retained his vigorous intellect to the eve of his death, which occurred on the 8th October, having attained the advanced age of 81 years.

Mr. John Edward Errington, another of our members, was born at Hull. After passing his youth on the Ordnance Survey of Ireland, he became assistant to Mr. Rastrick, who employed him upon the Birmingham section of the Grand Junction Railway. When that line passed into the hands of Mr. Locke, Mr. Errington, as his assistant, had charge of a district. This engagement with Mr. Locke led to a partnership with that gentleman, and together they completed that great system of railway communication which has united the North-Western system at Preston with Aberdeen and the North of Scotland. After Mr. Locke's retirement from the South-Western Railway, Mr. Errington was appointed engineer to the company, and in that capacity completed, shortly before his death, the extensions of that railway in the West of England.

Like his partner (Locke), Errington was chiefly celebrated for his strict regard to economy in carrying out the works under his charge, and this led to his adoption of steeper gradients than those generally used before his time, and resulted in such works as the inclines over Shap Fell and Beattock; but notwithstanding his desire to avoid "engineering triumphs," procured at large cost, Errington has left many fine works to testify to his skill as an engineer, among which may be instanced the Dutton and Vale Royal Viaducts on the Grand Junction; the Lune Viaduct on the Lancaster and Carlisle; the Dillicar and Tebay Viaducts on the same line; the Greenock Docks; and the Honiton Tunnel on the South-Western. Errington died on the 4th July, in his 56th year.

Dr. Hamel, Conseiller d'Etat actuel de S. M. l'Empereur de Russie, Membre de l'Académie Impériale de St. Pétersbourg, who resided many years in England, and who died in London on the 22nd of September, after a few days illness, was one of our oldest corresponding members, having been elected in 1815, and

was a constant attendant at our meetings. He was born in 1788, at Sarepta, on the Volga; distinguished himself early in life by the invention of an electrical machine; and in 1813, was named by the Emperor Alexander member of the "Académie de Médecine et de Chirurgie de St. Pétersbourg." He was appointed to accompany the Grand Duke (afterwards the Emperor) Nicholas, during his visit to England in 1813, and in 1818 he fulfilled the same duties towards the younger brother of the Emperor, the Grand Duke Michael. In 1821 he returned to Russia, and was elected, in 1828, "Membre de l'Académie Impériale de Sciences de St. Pétersbourg." It was through his exertions that the first exhibition of industry took place at Moscow, and he was employed in several other exhibitions in Russia; and, taking the liveliest interest in the progress of industry, he visited all the great exhibitions which have since taken place in France, England, and America. Dr. Hamel published a history of the steam-engine, a work written with the precision and care which distinguished all his scientific researches. He also published in the *Journal* of the Society a history of the electric telegraph, which is very complete and full of interest in a scientific point of view. Having studied during his first visit to England the system of teaching originated by Lancaster, he published an account of it in Russia, and thus became the means of its introduction into that country.

Exhibition of 1862.

When we met together at the opening of the last Session, the International Exhibition of 1862, was a vision of the future regarded with hopeful expectation. It has now become a portion of the past, and the rare and costly productions by which it was distinguished are already dispersed, never again to be collected within the same building. In what spirit shall we survey that rich storehouse of skill, and labour, and genius, employed for the use, the delight, and the instruction of man; in part the productions of the industry of our own day; in part the art collections of three generations, comprising, on the one hand, the choicest examples of the world's labour, and, on the other, the most cherished specimens of modern art?

Has the International Exhibition been a failure or a success, a disappointment or a triumph?

In order to answer that question satisfactorily, we must know the objects which International Exhibitions are intended to promote, the benefits they are expected to realise, the moral and social ameliorations they are intended to accomplish.

By no one could the aims of the originators of International Exhibitions be so authoritatively described as by your late Royal President, and at a public meeting held at the Mansion House in October, 1850, the views which prompted the Prince Consort to originate and direct the Exhibition of 1851 are disclosed in language so impressive, that I desire this evening to recall his address to your attention:—

It must, indeed, be most gratifying to me to find th a suggestion which I had thrown out, as appearing to me of importance at this time, should have met with such universal concurrence and approbation; for this has proved to me that the view I took of the peculiar character and requirements of our age was in accordance with the feelings and opinions of the country. Gentlemen, I conceive it to be the duty of every educated person closely to watch and study the time in which he lives, and, as far as in him lies, to add his humble mite of individual exertion to further the accomplishment of what he believes Providence to have ordained. Nobody, however, who has paid any attention to the particular features of our present era, will doubt for a moment that we are living at a period of most wonderful transition, which tends rapidly to the accomplishment of that great end to which, indeed, all history points—the realisation of the unity of mankind. Not a unity which breaks down the limits, and levels the peculiar characteristics of the different nations of the earth, but rather a unity the result and product of those very national varieties and antagonistic qualities. The distances which separate the different nations and parts of the globe are gradually vanishing before the achievements of modern invention, and we can traverse them with incredible ease; the languages of all nations are known, and their acquirement placed within the reach of everybody; thought is communicated with the rapidity, and even by the power, of lightning. On the other hand, the great principle of division of labour, which may be called the moving power of civilisation, is being extended to all branches of science, industry, and art. Whilst formerly the greatest mental energies strove at universal knowledge, and that knowledge was confined to the few, now they are directed to specialities, and in these, again, even to the minutest points; but the knowledge acquired becomes at once the property of the community at large. Whilst formerly discovery was wrapt in secrecy, the publicity of the present day causes that no sooner is a discovery or invention made than it is already improved upon and surpassed by competing efforts; the products of all quarters of the globe are placed at our disposal, and we have only to choose which is the best and cheapest for our purposes, and the powers of production are intrusted to the stimulus of competition and capital. So man is approaching a more complete fulfilment of that great and sacred mission which he has to perform in this world. His reason being created after the image of God, he has to use it to discover the laws by which the Almighty governs His creation, and by making these laws his standard

of action to conquer nature to his use—himself a divine instrument. Science discovers these laws of power, motion, and transformation; industry applies them to the raw matter which the earth yields us in abundance, but which becomes valuable only by knowledge; art teaches us the immutable laws of beauty and symmetry, and gives to our productions forms in accordance with them. Gentlemen, the Exhibition of 1851 is to give us a true test and a living picture of the point of development at which the whole of mankind has arrived in this great task, and a new starting point from which all nations will be able to direct their own further exertions. I confidently hope the first impression which the view of this vast collection will produce upon the spectator will be that of deep thankfulness to the Almighty for the blessings which He has bestowed upon us already here below; and the second, the conviction that they can only be realised in proportion to the help which we are prepared to render to each other; therefore, only by peace, love, and ready assistance, not only between individuals, but between the nations of the earth.

The Exhibition of 1851 gave a true test and living picture of the point of development at which the various nations of the world had then arrived, and served as the starting point from which to measure the progress since made in the pursuits of industry and art.

That Exhibition presented the most extensive and valuable collection of objects of industry ever before contained in a single building; and it appears from the official returns that the number of exhibitors was 13,937, of whom 7,381 belonged to Great Britain, with her colonies and dependencies, and 6,556 to foreign nations. And these numbers did not include India, Turkey, Egypt, and Tunis. From estimates supplied by the exhibitors, the total value of the objects exhibited was thus given :—

United Kingdom	£1,031,607
Colonies and Dependencies . .	79,901
Foreign Countries	670,420
	£1,781,928

This estimate was exclusive of the Koh-i-Noor diamond, to which it was difficult to assign a marketable value.

I have said that the Exhibition of 1851 gave a true test and living picture of the world's industry at that period, whether indicated by the raw material, or the finished products of the various countries represented on that occasion; and comparing that Exhibition with the one which has just closed, what should be our estimate of the progress made in the intervening period, brief as it is if regarded as a portion of the age of man—briefer still if contrasted with the duration of national life?

Progress is of two kinds, and may mark the onward march of advancing civilisation, or the gradual decline and ultimate decay of the living energies, whether of nations or individuals. The age in which our lot is cast is distinguished by great intellectual activity, by the general diffusion of knowledge, by numerous and important discoveries in science, by the application of the arts of design to the productions of industry, and by the diminution or removal of grave social ills. The results of such an age should be a steady advance in national prosperity, an onward progress in every department of industry, a marked improvement in the productions of skill and labour; and all these results are, I think, fully manifested in the Exhibition of 1862; whether regard be had to the number and the quality of the objects exhibited, or to the countries by which those objects were contributed.

In any estimate of the Exhibition a high place must be given to the machinery which was collected in the building, whether as regards the multiplicity of the objects, the excellence of the workmanship, or the accuracy of the component portions of the machines. Comparing this department of the undertaking with the machinery exhibited at our own Exhibition of 1851, or the Paris Exhibition of 1855, the great and rapid progress made in the perfection of our mechanical works was indisputable. The jury who examined this class of objects did not, as I believe, recognise any discovery of importance in the science of mechanics, although they witnessed novel applications of mechanical power; and the beauty, the finish, the precision, the power, and the efficiency of many of the steam engines, created astonishment in those who were unacquainted with the advance which this branch of mechanical skill and industry has recently witnessed.

The marine engines especially exhibited a concentration and economical employment of power, a simplicity and compactness of form and arrangement, a precision of action, and an accurate combination of their various portions, which place them in the foremost ranks of mechanical production; and in this department of construction we occupy the position which ought to be maintained by the first of maritime nations.

I am not in possession of official returns of the number of exhibitors in the present year, nor am I acquainted with any trustworthy estimate of the value of the objects exhibited; but instead of 13,937 exhibitors, as in 1851, the number in the present year has, I believe, exceeded 25,000, of which the foreign exhibitors, who, in 1851, numbered only 6,536, have amounted in the present year to 16,000. These numbers do not include the exhibitors of works of fine art, whether painting or sculpture, in which departments 6,000 objects were exhibited. Whilst the increase in the number of exhibitors has been

so large, it will be conceded by all to whom both Exhibitions were familiar, not only that the recent Exhibition as a whole far exceeded in interest, beauty, and value that of 1851, but that in almost every department of industry the improvement in the present year's Exhibition was very remarkable. That improvement must be attributed, doubtless in a large measure, to the characteristics of our age, the competition engendered by active rivalry, national and individual, art culture, increased intelligence, and the improved education of the artisan. But a share, and I believe a large share, of that improvement may be claimed for the Exhibitions of 1851 and 1855, and we may confidently expect that the recent Exhibition will not be less fruitful than its predecessors in those lessons which contribute to beauty of design, to an appropriate selection of material, to excellence of workmanship, and to economy of labour; and which enlist the aid of science and art in the pursuits of industry.

The capitalist, by travel through various countries, and by intercourse with the scientific and industrious classes in many lands, may acquire the knowledge necessary for the profitable conduct of his own affairs. The working man has no such opportunities for the culture of his faculties; and to enable him to benefit by the labour and skill of others their productions must be collected for his inspection; and it is scarcely possible to estimate too highly the importance to the industrial classes of such Exhibitions as that which has just closed. Educated or trained for special labour, confined to a narrow circle of observation, habituated to a definite and unvarying handicraft, it is most important that we should enable our artisans to observe the works of other men and other countries than their own; and to discern the methods employed to accomplish results with which they are familiar, but which they have attained by different processes. The knowledge they thus acquire should advance their skill, improve their taste, and enlarge their faculties. By these influences their intellectual character is raised, they are removed from those sensual indulgencies by which they are often shipwrecked, their moral nature is purified, they are elevated in social position, and their self-respect is cultivated and strengthened. In this Society, founded for the Encouragement of Arts, Manufactures, and Commerce, it is fitting to indicate how exhibitions of Industry and Art are calculated, in an especial manner, to benefit those who are engaged in the pursuits of industry. Nevertheless, we ought not to overlook the interest which the recent Exhibition excited in other classes, who visited it in great numbers, and to whom the works of fine art, no less than the products of industry, afforded great gratification.

The number of visits made to the building between the 1st day of May and the 1st day of November, amounted to six millions two hundred thousand, which is only a slight increase on the number of visits made to the Exhibition of 1851, and is below the number anticipated in the present year. Several causes have contributed to this disappointment, and we may especially mention two great national calamities—the death of the Prince Consort, and the wide spread distress in our cotton districts; a distress by which a large proportion of the population engaged in, or dependent on, that branch of industry, and who visited the metropolis in great numbers in 1851, was prevented by want of means from seeing the late Exhibition.

I cannot detail with any precision the financial results of the Exhibition, but I understand the money paid for admission on this occasion has amounted to £409,000, whilst the receipts for admission in 1851 were £423,792, including in each instance the payment for season tickets.

I have no official knowledge of the expenditure of the Commissioners, but I am informed that the claim on them for the services of the police force exceeds £19,000; a subject to which the attention of the members of the Society, as well as the public, should be directed, in order that it may be brought under the consideration of the Home Secretary, by whom certain powers of control and superintendence are exercised in relation to the police force. In France and other European countries industrial exhibitions have been undertaken at the risk of the Governments; and in Spain, as well as Turkey, where proposals have been made for holding Exhibitions next year, the Governments will no doubt assume the risk. In 1855 Parliament voted £50,000, of which £40,000 only was expended, to assist English exhibitors in sending their goods to, and displaying them and providing for their safety in Paris; and in 1851 a sum of £67,896 was subscribed by the public towards the expenses of that Exhibition. No contributions from the Government, or subscriptions from the public, are now sought, but the preservation of public order, and the protection of property, at an exhibition promoted on public grounds, and calculated to ensure important public benefits, ought assuredly to be undertaken by the police authorities, whose funds are in part raised by assessment on the metropolitan parishes, and in part contributed from the Consolidated Fund.

To ensure the periodical recurrence of international exhibitions has been the aim of this Society, and it was intended in the first instance that they should be held quinquennially. The first charter granted to the Commissioners for the Exhibition of 1851, recited the formation by this Society of annual exhibitions of the works of

British Art and industry, and their proposal to establish an enlarged exhibition of the works of Industry of all Nations to be held in that year; and our late Royal President, at the close of that Exhibition, acknowledged the obligations of the Royal Commissioners and the public to the Society for having carried out the preliminary arrangements for that Exhibition to an extent which justified the Prince Consort, as our President, in the application he made to the Crown for the issue of a Royal Commission. It seemed natural that the Society, which undertook the preliminary arrangements for the first International Exhibition, should originate a second, especially as it was known that the Commissioners for the Exhibition of 1851 would not assume the responsibilities of the undertaking. On the invitation of your Council, the noblemen and gentlemen named as Commissioners for the Exhibition of 1862, agreed to assume the management of the undertaking;—after a guarantee had been promised to such an extent as to show a strong opinion in the public mind that the time for holding a second International Exhibition had arrived; after the guarantors had expressed an opinion that the absolute control of the undertaking ought to be entrusted to five gentlemen named by the Council; and after the Commissioners of the Exhibition of 1851 had intimated their approval of the project and their confidence in the proposed mode of management, and had promised their support and assistance. On the petition of the Society a Royal Charter of incorporation was granted to the Commissioners, and a guarantee deed was executed for the aggregate sum of £448,460, for the most part by members of the Society. I have entered into these details, because it seems to have been thought, in some quarters apparently uninformed of the true state of the case, that the Society, in originating the recent Exhibition, had intruded into the labours of others willing to undertake the task which the Society has discharged; whereas, it may be confidently affirmed that, but for this Society, the year 1862 would have witnessed no International Exhibition.

Whilst, however, I claim for this Society whatever merit may belong to the work they have performed, I would add that, but for the counsel and assistance which was afforded them by their late Royal President, it would have been difficult, if not impossible, to overcome the obstacles in their path, or to reconcile views in influential quarters which were conflicting and full of embarrassment.

With the view of placing before the public the most authoritative and permanent record of the Exhibition, the Council undertook the publication of the reports of the several juries, descriptive of the progress of industry since 1851, and it is a subject of regret to the Council that those reports were not completed before the close of the Exhibition. The Council were assured that all the reports would be in the hands of Dr. Playfair, the Special Commissioner of the Juries, early in the month of August. The month of September, however, arrived without the reports being completed, and the Council then determined to issue to the subscribers all which had been received, with an intimation that when the remaining reports shall be supplied, the Society will exchange the parts issued, if uninjured, for the completed volume. This publication was undertaken by the Council with the sanction of Her Majesty's Commissioners (who provided only for the publication of the awards of the juries), and is under the charge of Dr. Lyon Playfair, to whom the official reports are transmitted by the several juries.

Much difference of opinion has prevailed with respect to the policy of distributing medals or other marks of distinction to exhibitors, on the awards of juries appointed to consider the merits of the objects exhibited, and to recommend rewards for excellence, whether in design, workmanship, or economy of production, for novelty of invention, for novelty combined with utility in the employment of materials, for improved processes of manufacture, or for other substantial improvements. In order to aid in the formation of a sound judgment on this difficult question, the Council have transmitted a circular letter to Jurors, Special Commissioners, and Exhibitors, inviting their opinions on the questions—whether rewards for merit, by medals or otherwise, are desirable in International Exhibitions; and whether a better method than the appointment of Juries can be suggested for making the awards; and it is the intention of the Council to embody the answers which they have received in a public report.

The Commissioners for the Exhibition of 1862, who have gratuitously discharged laborious and responsible duties, have met, as it seems to me, with but scant justice from some of the organs of public opinion. That they may have sometimes miscarried is very probable, and although their nomination by the Council was entirely approved by the Guarantors, neither the one nor the other expected that the management of Her Majesty's Commissioners would be so faultless as to disarm hostile criticism; and I ventured, early in the progress of their proceedings, to intimate that their task would probably prove a thankless one.

In surveying the late Exhibition, we are saddened by the absence of the illustrious Prince who was so conspicuous on all occasions in 1851, whose personal qualities conduced in so eminent a degree to the success of that undertaking, and who, not long before his departure hence, conveyed to us the assurance of his deep interest in that Exhibition, to the success of which his

presence and encouragement would have largely contributed. But although he was not permitted to guide by his counsel, or to aid by his presence, the labours of Her Majesty's Commissioners, or to promote, by his exertions and patronage, the success of the Exhibition of 1862, I may recall the enlightened spirit and admirable temper which characterised his presidency in 1851, by repeating the concluding words of his address to Lord Canning at the close of that Exhibition, applicable alike to this as to that occasion :—

In now taking leave of all those who have so materially aided us in their respective characters as Jurors and Associates, Foreign and Local Commissioners, Members and Secretaries of Local and Sectional Committees, Members of the Society of Arts, and Exhibitors, I cannot refrain from remarking, with heartfelt pleasure, the singular harmony which has prevailed amongst the eminent men representing so many national interests—a harmony which cannot end with the event which produced it. Let us receive it as an auspicious omen for the future; and while we return our humble and hearty thanks to Almighty God for the blessing He has vouchsafed to our labours, let us all earnestly pray that that Divine Providence which has so benignantly watched over and shielded this illustration of nature's productions, conceived by human intellect and fashioned by human skill, may still protect us, and may grant that this interchange of knowledge, resulting from the meeting of enlightened people in friendly rivalry, may be dispersed far and wide over distant lands; and thus, by showing our mutual dependence upon each other, be a happy means of promoting unity among nations, and peace and goodwill among the various races of mankind.

EXAMINATIONS.

The 11th Annual Conference with the Council of the Society of the Representatives of the Institutions in Union, and the Local Educational Boards, was held at the Society's House, on the 23rd June; and the report of the Secretary, embodying the results of the Society's Examinations for the present year, was laid before the meeting by the Council.

The final Examinations were conducted at 81 places, or centres of examination, and it appeared from the returns of the Local Educational Boards that 903 Candidates had presented themselves for the previous examination, of whom 773 passed that examination in a satisfactory manner. At the final examination 815 Candidates were examined, and 668 received certificates that they had passed a satisfactory examination in one or more of the 29 subjects for which the Society's Prizes are offered. Of the Candidates at the final examination, 637 were examined in England and Wales, 175 in Scotland, and 3 in Ireland.

The number of papers worked by the Candidates was 1,217, and the number of certificates awarded 942, of which 239 were of the first class, 372 of the second class, and 331 of the third class. 19 first class prizes of £5, and 16 second class prizes of £3, the gift of the Society, were awarded to successful Candidates; and additional prizes, 8 in number, of the value of £11, the gift of individual members, were awarded for meritorious papers in Practical Mechanics, English History, and English Literature.

In ten subjects of examination no prizes were awarded, and in three other subjects no second prize was awarded; and 26 prizes offered by individuals were not taken.

The number of Candidates who failed was 147, and the number of papers worked, for which no certificate was awarded, was 275.

Success and failure presented the same relation to Candidates and papers in the last as in the present year, namely :—

	Candidates examined.	Failures.
1861	750	133
1862	815	147

	Papers worked.	Certificates awarded.
1861	1,079	842
1862	1,217	942

The following table represents the gradual but steady increase which has taken place in this work of the Society during the last four years :—

	Number of Candidates.	Papers worked.
1859	480	766
1860	586	821
1861	750	1,079
1862	815	1,217

The reports of the Examiners, which have already appeared in the *Journal*, indicate an improvement in the quality of the papers worked in some important subjects, but the number of candidates who offer themselves for examination in those studies which are closely connected with the pursuits of artisans and handicraftsmen, presents no such substantial increase as to realise in this respect the hopes of the Council.

The subject of Animal Physiology in relation to health elicited a large increase in the number of papers, from five last year to 40 this, but the Examiner remarks that no papers approached in merit the highest of those written last year, and no prize was awarded for any paper on that subject sent in this year. The subject of Agriculture was limited to a single paper, and no prize was awarded, whilst in Botany, in connection with the practice of Horticulture, the number of papers was very limited, and no second prize was given; and in Political and Social Economy the Examiner observes, that the standard of the Candidates was below anything he had seen before in these examinations. I have on former occasions indicated the importance to the citizens of a free State, largely entrusted with the responsibilities of self-government in the various departments of local and

general administration, of a careful study of the language, literature, and history of their own country; and the regret I entertained that our students do not familiarise themselves in greater numbers with subjects of such great importance and deep interest. It is satisfactory on this occasion to observe a considerable increase in the unmber of papers on English History, from 46 last year to 80 in this, and it is some compensation for a reduced number of papers on English Literature, that every one of the Candidates passed (a good proportion being in the first class), and that they generally manifested a sound acquaintance with the text of the authors in which they were examined. The first prize for English Literature was awarded to Elizabeth Fulford, aged 18, of the Birmingham and Midland Institute. It would be very profitable to our students to consider well the observations of the Examiner in English History, who had presented to him a larger proportion than usual of papers of inferior merit; and who remarks :—" Vague, or inaccurate knowledge, is worse than useless. It is no sufficient answer to say that Magna Charta is the first bulwark of English liberty, without specifying any of its provisions. Those who intend to offer themselves for examination next year, will do well to practise themselves in writing answers, without books, to old examination papers. Accuracy, and thoughtfulness, are the two qualities that tell most in all examinations, and both are best perfected by exercise."

The Council were authorised last year to notify the intention of His Royal Highness our late President to offer annually a prize of 25 guineas to the Candidate who, obtaining a certificate of the first-class in the current year, should have obtained in that year, and the three years immediately preceding, a greater number of such certificates than any other Candidate, To win that prize is the highest distinction within the reach of the Candidates for the Society's rewards, and it has been awarded this year to Mr. J. G. Greenhough, of the Bradford Mechanics' Institute, a mercantile clerk, aged 19, who has received from the Society the following certificates :—

1859. Arithmetic (1st class), Algebra (3rd class).
1860. English History (1st class), Geography (1st class).
1861. English Literature (1st class), Algebra (2nd class), Geometry (2nd class), Trigonometry (3rd class).
1862. Algebra (1st class), Trigonometry (2nd class), Geometry (1st class, with 1st Prize).

Few circumstances can better show the advantages of adult study than the progressive advancement of this young man in the knowledge of those subjects to which his time and thoughts have been devoted with exemplary patience and industry; and no better proof could be afforded of the value of the prize offered by our late Royal President than that it should be won by so deserving a student, and become the stimulus, it may be hoped, in other instances, to equal application and perseverance.

Her Majesty the Queen has been graciously pleased to signify her intention to continue annually the prize founded by His Royal Highness, whose name and memory will thus be directly connected with the efforts making by the Society to diffuse amongst the industrial classes that intelligent knowledge of the arts of production which it was the constant aim of the Prince to encourage and extend.

In my last address mention was made of the formation of a Central Committee of Educational Unions in connection with the Society, with the object of promoting uniformity of action and a fixed standard in the elementary and preparatory examinations held by various bodies in connection with the Society. That fixed standard is ensured by the employment in every Union of the same examination papers, and these are provided by the agency of the Society.

These uniform papers were first used in the spring of this year, in the elementary examinations held at Aldershott, Hertford, Leeds (the Young Men's Christian Association), the West Riding Educational Board (five centres), and the Southern Countries Adult Educational Society (35 centres). Candidates were classed in two divisions, senior and junior, of whom 308 entered the junior division, and 157 passed a satisfactory examination, and 118 entered the senior division, and 71 passed satisfactorily. The advantages of having uniform papers and a uniform standard for certificates is so obvious that, it is hoped, they may be extensively employed in future years.

The endeavours which have been made to prolong the school life of the children of the labouring poor have met with but partial and limited success, and it may be doubted whether the tendency of late years has not been to accelerate the removal of such children from school to work, and thus to shorten the continuance of school life. The report of the Education Commissioners, presented to Parliament in 1860 showed that the attendance of scholars diminishes rapidly after 11, and ceases almost wholly at 13, as only 5 per cent. of the children at our day schools are over that age. Whilst upwards of two millions of the children of our working men (95 per cent. of that number being under the age of 13) receive daily instruction in our schools, hundreds of thousands of those children exchange a school life for one of labour every year. Institutes, evening schools, with classes for systematic instruction, supply the only means whereby the instruction given to the child in the day-school can be preserved and extended in the years of boyhood and early manhood, and hence the importance of that branch of the operations of the Society which encourages the instruction of

adult students in affording to all the opportunity, by suitable examinations, of testing their knowledge, discovering their defects, and obtaining those distinctions which the certificates and prizes of the Society confer on the deserving and meritorious student.

A recent number of the *Times* contained a report of the proceedings of a meeting (at which Lord Stanley presided) on the occasion of the opening of a new Mechanics' Institution, at Stockport, and in a leading article of the same journal are the following comments on the agency of the Society in the work of Examination :—

"Lord Stanley speaks with the greatest praise of the Examinations conducted, at regular periods, by the Society of Arts, by the local institutional associations of Lancashire and Cheshire, and by middle-class schools. It is, no doubt, very desirable that the efforts of those associations for middle-class education should be periodically tested, and we have no objection to the Society of Arts, or any other society, undertaking that office, so long as it is clearly understood that no privilege or advantage whatever is to be given at the public expense to the succcessful candidates for the Society's prizes. The Society of Arts is a very respectable (and may, for aught we know, be a very learned) body, but we have yet to learn on what grounds it claims the right to constitute itself the public examiner of the middle classes of England, or to hold out Government prizes as objects of temptation to those who choose to submit to their authority."

I have noticed that article, not with any desire to complain of its temper or spirit, but simply to correct a mistaken impression which appears to prevail with respect to the position of the Society ; and to negative the assumptions that it claims the right to constitute itself the public examiner of the middle classes of England, or to hold out Government prizes as objects of competition to those who choose to submit to its authority.

When in 1852 the Society established its Union of Institutions, one of its principal objects was to encourage those bodies to become places for the systematic instruction of adults engaged in the arts of industrial production: and in 1854, at a conference of the representatives of the associated institutions, the Society was invited to conduct systematic Examinations in various branches of knowledge, and to distribute certificates to those Candidates who, being presented by the institutions in union, should give proof of their intelligent acquaintance with the subjects in which they might request to be examined. These Examinations, it need scarcely be said, are purely voluntary on the part of the Candidates, who are all connected, directly or indirectly, with our Society, being, for the most part, members of affiliated Institutions, and being, without any exception, presented for examination by one of its local Boards. The Society derives no pecuniary advantage from the labours it has undertaken, but expends monies from its own funds in the work of Examination, and in rewards distributed to the most distinguished candidates. The Society does not hold out Government prizes as objects of competition to those who choose to become Candidates for the rewards it distributes. It is true that members of recent administrations, constituted of different political parties, have occasionally placed at the disposal of the Council a small number of nominations which have been presented by them to Candidates who distinguished themselves at the Society's Examinations. Those nominations are not to offices, but simply entitle the holders to the privilege of competing for office ; the candidates present themselves for a competitive examination to the Civil Service Commissioners, and, if successful in such examination, are presented to clerkships in some public department.

The only effect of these acts of kindly recognition of humble merit, by the ministers of the Crown, has been the admission of young men, who have shown that they possess recommendations which qualify them for useful service, to compete for public employment with gentlemen, nominated for the most part by the political supporters of the government of the day. I believe I am correct in saying that every prize student, who has been recommended by the Council, has been approved by the Civil Service Commissioners and appointed to the situation for which he competed ; and that more than one has been promoted for good conduct in the office to which he was appointed.

I will not dismiss this subject without naming the ministers who have presented those nominations and who were Earl Granville, the Earl of Derby, and Viscount Palmerston, to whose names must be added that of Mr. John Wood, a former Chairman of the Inland Revenue Board.

Those who are most familiar with the subject of adult instruction, best know the immense difficulties which obstruct that work; and if any one is tempted to complain, that the progress made by the Society is less rapid than could be wished, he may be consoled by the assurance, that, in many large portions of the United Kingdom, this Society has stimulated the use of means, and has supplied motives for the systematic instruction of youths and adults over 16 years of age ; whilst it has also called into action and assisted to organise and methodise, in the hands of bodies connected with the Society, suitable means for continuing the instruction of children at that critical period of their lives, which intervenes between the age of 12, when the children of the poor usually leave school, and that of 16, when as adults the Society's own examinations are open to them.

Copyright in Works of Fine Art.

It will be in the recollection of many of the

members of the Society, that in the session of 1857-8, a Committee was appointed by the Council to inquire into the subject of copyright in works of the fine Arts, of which Sir Charles Eastlake, the President of the Royal Academy, was appointed Chairman. That Committee reported that the laws of British artistic copyright were defective and unjust because they afforded no sufficient protection to artists against the piracy of their productions, and no redress to purchasers for the invasion of their property; that, by reason of the defective state of the law, direct encouragement was given to an extensive manufacture of spurious works, which were sold as originals, and injustice inflicted on the subjects of foreign states who had entered into International copyright conventions with her Majesty, and whose works were not protected from piracy in British territories, while protection was afforded in such states to the works of British artists. A bill to establish Copyright in works of the fine arts was thereupon framed under the direction of the Committee, and received the sanction of the Council, who, in the session of 1860, by means of a deputation to Lord Palmerston, sought the aid of the government in passing that Bill.

The state of public business prevented the introduction of the Bill during that session, but in the course of the last year the Bill was introduced into the House of Commons by the Attorney-General (now the Lord Chancellor), who devoted a large amount of valuable time to the revision of the Bill originally approved by the Council, but his Lordship's bill only proceeded to a second reading by reason of the pressure of public business. The Council conferred on the subject with the Lord Chancellor before the commencement of the last session of Parliament, and were informed by him that the Solicitor-General would be authorised to take charge of the Bill as a government measure, and they were advised to modify and limit the provisions of the Bill which had been introduced in the former session, in order to facilitate its progress through the Legislature. The law as it then stood conferred a copyright in engravings and works of sculpture, but none existed in paintings, drawings, or photographs; and it was the object of the Council to consolidate and amend the law of copyright with respect to engravings and works of sculpture, as well as to confer on artists a copyright in paintings, drawings, and photographs. The Council, acting on the advice of the Lord Chancellor, omitted from the Bill the provisions for a consolidation of the law of copyright in works of the fine arts, and confined its provisions to the creation of a copyright in paintings, drawings, and photographs, to continue for the natural life of the artist and seven years after his death.

The Bill thus altered was introduced into the Commons by the Solicitor-General, and passed through that house with some amendments; and after being considered by a Select Committee of the Lords, received the sanction of the legislature, and is now printed in the Statute Book under the title of "An Act for amending the law relating to Copyright in works of the Fine Arts and for repressing the commission of fraud in the production and sale of such works."

Is it not strange that, until the present year, our laws should have given no protection to artists in the enjoyment of works of the highest genius and the most brilliant imagination; and that, although we acknowledged the natural and undisputed right of the rudest industry to the enjoyment of its productions, we disregarded the claims of men whose labours have afforded mankind some of the highest and purest pleasures? The Council congratulate the Society on the success of their efforts to redress the injustice inflicted on artists by a defective state of the law, and they desire to acknowledge their obligations to those members of both Houses by whom the claims of artists were advocated; they would especially instance the Lord Chancellor and Lord Granville in one House, and the Solicitor-General, the Right Hon. Spencer Walpole, and Mr. Rolt, in the other,—all of whom laboured assiduously to ensure to artists the due reward of their genius and industry. Our acknowledgments are likewise due to Mr. Spencer Vincent and Mr. Edwin Field, for the valuable services rendered by them in the preparation and progress of the Bills submitted to the legislature; and to Mr. Roberton Blaine, by whom a very accurate and comprehensive report on the laws affecting copyright in the Fine Arts was prepared at the request of the committee appointed by the Society, and who drew the Bill for consolidating the law of copyright which was approved by the Committee and sanctioned by the Council.

Cotton Manufacture.

The deplorable paralysis by which the great staple manufacture of cotton has been smitten, the destitution and suffering of that large class of the population engaged in, or dependent on, the production of cotton goods, and their admirable deportment under privations such as the present generation has not before experienced, have excited the sympathy and won the admiration of all classes of the community. That they will be provided with food and clothing, and supplied with everything needful for their bodily health, to whatever period the cessation of their employment may be prolonged, I cannot doubt; because, unless this provision be made, the nation will not perform its duty to men who are willing and anxious to work, and who have been reduced

to destitution by no fault of their own. But, although it will be necessary for the present to resort to the accumulated capital of past years, in order to feed and clothe men and women to whom employment cannot be supplied, the great end and aim of all, who can contribute to the solution of the problem, will be to provide a supply of suitable raw material on which they can be set to work.

Our embarrassment has been caused by our dependence for the raw cotton on one country—the States of America—whence our imports in 1860 exceeded 100 millions of pounds, whereas our imports from all other countries did not exceed 30 millions. The Council of this Society have perseveringly directed the attention of our manufacturers to the danger of depending so largely on the American States for a supply of raw cotton, and to the extensive fields for the culture of cotton which exist in almost every quarter of the globe.

In the session of 1845-6, a paper was read in this room by Mr. James Banks, on the cotton of Honduras and Yucatan, and on free-labour cotton from Africa and the East Indies, and the attention of our members and the public has since that time been perseveringly directed to the capabilities of India, Australia, Egypt, South Africa, and South America, to grow cotton for the English market. Amongst other able papers on the subject may be mentioned those of Mr. J. Crawfurd, Mr. Ashworth, and Mr. Leonard Wray.

Dr. Forbes Watson, who read papers on "The Growth of Cotton in India" in the Sessions of 1858-9 and 1859-60, estimated the quantity of cotton grown in that country at upwards of 2,400 millions of pounds, or more than double the average consumption of this country. It has been objected that the Indian cotton sent to this country has been short in fibre, and otherwise so inferior in quality as to be unfitted for the English manufactures. Nevertheless, in the last century the finest muslins were manufactured in India in large quantities for importation into this country, and chintzes and calicoes were brought from that country to this for consumption, whilst the raw cotton of India and China was extensively employed in the manufacture of nankeens to be used in England. The interests involved in the cotton manufactures of Great Britain are of an importance which can scarcely be exaggerated, and hence the deplorable consequences of what has been truly called a cotton famine. According to official returns, the value of the raw cotton imported into this country in 1860 was £35,756,889, and of the raw cotton exported £5,388,190, so that the value of the cotton retained for home consumption exceeded 30 millions sterling. The value of the twist and yarn exported in that year was estimated at nearly 10 millions, and of cotton fabrics in various stages of manufacture at upwards of 42 millions, and if 18 millions be added for the value of the cotton fabrics consumed at home, which is probably less than the actual cost, the gross value of the produce of our cotton manufactures amounted to 70 millions in the year 1860. In a paper of Mr. Redgrave, one of Her Majesty's Inspectors of Factories (who read papers of much interest in the years 1860-61 before this Society, as well as before the Statistical Congress, on our textile fabrics), he supplied the following estimate made for the year 1856 with respect to the numbers of the population employed in or dependent on the cotton manufacture within the United Kingdom:—

Number of persons employed in factories	379,213
Do. do. out of factories	370,787
Do. do. dependent on the above	1,350,000
	2,100,000

Mr. Redgrave estimated the wages of the persons employed in cotton factories at nearly 10 millions sterling; and if an equal sum be estimated for the wages of those employed on cotton goods out of factories, the gross yearly sum paid in wages may be set down at 20 millions.*

The Colonies.

Our colonial possessions, including the dependencies of the empire, have attracted a large share of the attention of this Society, and it has been for many years the aim of the Council to collect and diffuse accurate information on the products and resources of countries many of which are peopled by men of our own race and language, spread over a large portion of the surface of the globe. How remarkable has been the growth of many of our colonies during the last 10 years in every element of prosperity, and how full of interest were the indications of their progress in the recent Exhibition.

Metals of every description, from the costly gold to the humble but in some respects more valuable iron, coal fields of great extent, timber of great variety and extraordinary beauty, grain, and other articles of food of the very finest quality, live stock in great abundance, wines, described as of a high class, wool in large quantities, cotton of the finest fibre and texture, are amongst the productions of our colonies, with which we have been made familiar by the specimens forwarded to the Exhibition. No single object in the Exhibition excited more

* The number of able-bodied males employed in cotton factories in Lancashire is given at 89,041 only in a Parliamentary paper of last session.

attention than the pyramid under the eastern dome, designed to show the small space occupied by the gold exported from Victoria, in the ten years ending 1st October, 1861, which in weight approached 800 tons, and in value 105 millions sterling. The results of the Exhibition must be highly beneficial to the Colonies, inasmuch as the numerous visitors, home and foreign, have had visibly presented to them the amazing variety and the great value of their productions. In papers on the British Colonies, contributed to the *Journal* by Mr. P. L. Simmonds, in the course of last year, it is shown that the aggregate population of our Colonies and Dependencies is 195 millions; their imports and exports, 176 millions; their revenue, 44 millions; and their imports from the mother country, 46 millions. Nevertheless it is maintained, by a certain school of economists, that those possessions are a burden and not a benefit to the home country. The questions involved in the possession and rule of Colonies may be regarded as within the domain of political rather than economical science, and the union of ships, colonies, and commerce, has hitherto been proclaimed as an important element in the growth and grandeur of nations.

The use of colonies in ensuring the means of regular and constant emigration was ably advocated before the British Association, at their recent meeting, by Mr. Herman Merivale, and the benefits of continued and regular emigration was shown by a comparison between the progress of population in this country and France. By colonisation England has become the founder of orderly, intelligent, and industrious communities, by whom the arts, the language, the domestic habits, as well as the faith and worship of the home country, have been preserved and extended. Situated in every quarter of the globe, placed under almost every parallel of latitude, characterised by the utmost diversity of climate, they produce the raw material required for our manufactures, and offer markets for the produce of our looms, and whatever else may be contributed by our arts and industry.

The Council have agreed to renew the lease of this house, in which the meetings of the Society have been held for nearly a century, and which is associated with recollections, sometimes of success and sometimes of failure, in labours of a very varied character. The possession of these premises has thus been secured for 35 years, on terms which the Council regard as favourable. They must soon consider by what alterations the building can be rendered more adequate to the wants of the Society than it has recently been found, and it will be the aim of the Council to render our library more useful to the Society by providing such additional accommodation as will make the books more easily accessible to the members.

The annual exhibition of patented mechanical inventions has been inconveniently limited for want of space in this building, and the exhibitions have not kept pace with the progress of science, and have not been worthy of the present position of the Society.

There was no exhibition in the rooms of the Society in 1852, and, acting on that precedent, the Council do not propose that an annual exhibition shall be held in the next year.

The Council desire me to acquaint you that the following papers will be read before Christmas at our evening meetings:—

November 26.—"On the Utilization of Peat, with Reference more Particularly to the Manufacture of Hydro-Carbon Oils." By B. H. Paul, Ph.D.

December 3.—"On Thompson's Process of Boatbuilding by Machinery." By D. Puseley. Illustrated by models.

December 10.—"On the Construction of Labourers' Cottages and Sanitary Building Appliances." By John Taylor, jun., architect. On this evening Major-General Tremenheere will preside.

December 17.—"On the Mines and Minerals of the United Kingdom." By Robert Hunt, F.R.S., Keeper of Mining Records, Government School of Mines.

Three silver medals were awarded by the Council for papers read before the Society during the last Session, at their evening meetings; and it will be an agreeable portion of this evening's duties to deliver those medals, as well as the prize of the Prince Consort, in accordance with the awards of the Council.

From the formation of this Society it has sought to stimulate inventions and encourage the application of science to the arts of production by the offer of premiums on a variety of subjects. Those premiums have been varied from time to time so as best to meet the wants of each period, and to promote the objects for the encouragement of which the Society was founded; and the Council propose, in the course of the Session, to issue a revised list of premiums to be offered by the Society.

In former addresses I have indicated the important services which may be rendered to the Society by our members, including, as they do, a large number of men distinguished in art or science, and possessed of qualifications of a very varied nature, eminently calculated to promote the ends and aims of the Society. And it is the intention of the Council to seek to enlist the services of those members who are willing to take a part in the work of the Society, by assigning special departments of investigation to members classified with relation to subjects with which they have been familiarised by their callings or studies.

The revision of the list of premiums is a work to which the members may usefully contribute from the familiarity of many of their number with the applied sciences and industrial arts, which it is the special business of this Society to encourage.

The Council do not, however, rely on their members alone for assistance and co-operation. They gratefully acknowledge the services of the Board of Examiners and of Committees specially constituted for investigations of an important character, and who contribute largely to the usefulness of the Society.

To a Society for the Encouragement of Arts, Manufactures, and Commerce, abundant means of usefulness are offered in our day and country, but it is only by employing the opportunities afforded us in a spirit of wisdom and persistent activity, that we can retain the public sympathy and confidence. That we have earned that confidence, is shown by the unexampled growth of our numbers from a little over 300 in 1845 to nearly 3,000 at the present time.

May our labours be directed to the advancement of science and its extended employment in the pursuits of industry, and to the cultivation of the arts which minister to human happiness, and thus, in the language of Lord Bacon, we shall best advance the glory of God and the welfare of man's estate.

Vice-Chancellor Sir William Page Wood rose to move that the thanks of the meeting be given to the Chairman for the interesting and excellent address he had just delivered. He would be very brief in his remarks, as there was other business to transact; but there was one remarkable feature in that address which forced itself upon his mind, and that was, that it had been well shown how intimately connected was the name of the revered Prince Consort with most of the really valuable and important operations of the Society, from the very beginning of the address, where His Royal Highness was spoken of as the promoter of the first Great Exhibition in this country, down to that passage where allusion was made to the examination prize which was about to be delivered to the young man who so richly deserved it. Most thankful must they all feel that in considering the proposition for a national memorial to that illustrious Prince they did not allow "the native hue of resolution" to be "sicklied o'er with the pale cast of thought," but at once made the splendid donation of a thousand guineas to that fund—an example which he would have been glad to see more generally followed—instead of allowing that deep feeling which unquestionably existed throughout the country at the sad event which had befallen them to become chilled by time, and by what was natural to the English mind, the indulgence of their habit of criticism as to what was likely to be done with the money appropriated to this great national object. But to return to the object for which he had risen—viz., to thank the Chairman for the able address he had favoured them with, he begged to remark that this was the fourth address which Sir Thomas Phillips had delivered from that chair in his capacity of Chairman of the Council; and most thankful should they be that at a period when the Society had emerged from a comparatively dormant state, as evinced by the numbers presented to them—for whereas, in 1845, the members amounted to only 300, they had increased to nearly 3,000 in 1862—most thankful should they be that, at a period of such activity, they possessed in their chairman a gentleman competent to deliver such an address—one whose characteristics through life had been steadiness of principle and unflagging energy of purpose; one who, as they all knew, had been called upon in early life to combat ignorance at the peril of his life, in the melancholy form of brute violence, but whose lot it was now to combat it with weapons more congenial to his mind than physical force—the weapons of light and truth. His labours in the many departments of education with which his name had been connected—but in none more than as associated with this Society—had contributed to advance that degree of general information and knowledge throughout the whole country, the results of which were so admirably summed up in the beautiful passage from Lord Bacon, with which he had concluded his address.

Mr. J. G. Frith said he felt great pleasure in seconding the motion.

Mr. J. H. Murchison said he had always regarded the object of these annual addresses to be to lay before the Society the policy which the Council intended to pursue during the approaching year. The wording of the bye-laws would bear him out in that. It seemed to him singular that such should be the arrangements of this Society, that five months should have elapsed since the Council was appointed before the members were put in possession of the programme of the policy they intended to pursue during their year of office—that term being now reduced to the short period of seven months. He had listened to the address with great attention, and had waited every moment to hear the announcement of the policy which the Council intended to pursue during their term of office. They had heard some well-merited remarks upon the lamented deaths of a few of their more distinguished members, but he was anxious to hear what course the Council intended to pursue with regard to the affairs of this Society. He was anxious to know what had become of that question which occupied their attention so much during the past session, which, it appeared to him, the Council would not support, because it was promoted by the members of the Society; for although, when they met in that room, they cordially supported the Council by approving the vote of a thousand guineas, they were prevented by the Council from doing what a deep-felt regret at the loss the Society had sustained would have prompted them to have done, and were asked to withdraw the proposition that the Society should have a memorial of its own of its late President, until a fitting opportunity should present itself of bringing it before the members. He had urged that subject upon the Council, but he was told that the members of the Society felt no interest in it—that they would not support it—and that no one would attend the meeting; in fact, that he would not get a sufficient number to constitute a meeting to promote so important an object. He was, however, determined, at all events as far as his humble exertions could accomplish it, that the meeting should not be a failure. He sent in to the Council a requisition which he was sure they would admit was not second—either in influence or in the distinguished names which it bore—to any requisition ever sent in to the Society of Arts, or any other society in this kingdom. After that a meeting of the Council was called, and he was told that there was no objection to a general meeting for the purpose indicated. The result was that a very influential meeting took place in that room, at which it was recommended by the Council that the question of the Society's memorial to its late president should be left to them to be brought before the members at a fitting time. The reason why it was not then thought a fitting time was that it would be likely to interfere with the public subscriptions to the national memorial. Now, he would say he did not believe their abstaining from having a memorial of their own had helped the national memorial in any way, but he believed it was the officious, the mistaken course, adopted by the Council of this Society, which had more to do with the want of success to the national memorial than anything else which had existed. They had an official report from the Council to the effect that they were going to inform every man and woman in the kingdom that the illustrious Prince Consort had departed this life. It seemed that the Council

supposed the people of this country had arrived at a great degree of ignorance, while it was thought they had progressed in the other direction. The "penny committee" was formed, which, in his opinion, had done more to reflect discredit upon the Society than anything else. (Cries of "Time.") Those interruptions showed the weakness of the views of those who resorted to such despicable means of expressing them; all he could say was, they were never resorted to by those who knew their cause was a good one. He was anxious to hear from the Council what had become of that "penny committee," and what was the amount of subscriptions which, through its unexampled exertions, it had gained towards the national memorial. He had also been anxious to hear what steps had been taken to obtain for the Society a memorial of its late president. The question raised on a former occasion was that the Society might not remain long in its present premises. They had, however, heard it stated to-night that the further lease of the premises had been secured upon terms which were considered favourable. They heard that in the report of the Council in June last, and the amount of the premium to be paid for the renewal of the lease was also stated. That being the case, the principal obstacle was removed, and he should like to know why they had not been informed what was intended to be done with regard to the memorial to the late president?

The Chairman said this had been stated in his address.

Mr. Murchison had not heard it; but that was not his fault, as several gentlemen near him complained that they could not hear a great deal of what was said.

A Member rose to order.

The Chairman said he was very reluctant to interpose, except it was the wish of the meeting that he should do so.

Mr. Murchison contended that his remarks bore strictly upon the address which had been delivered, and what he complained of was, that it was not in accordance with the bye-laws, as an indication of the policy which the Council intended to pursue during their year of office. What he wanted to have heard was something new; and he would say, upon the points to which he had alluded, the address of the Chairman was very deficient.

Mr. William Hawes said he had deprived himself of the pleasure he should have had in seconding the motion of a vote of thanks to the Chairman, because, seeing Mr. Murchison present, he rather expected that some observations of the kind they had just heard would be addressed to them. They had been told by Mr. Murchison that nothing had been said in the address to indicate the future policy of the Society. He believed that if Mr. Murchison had paid any attention to the address, he would have found that the future policy was fully indicated by the remarks which had fallen from their Chairman. He (Mr. Hawes) contended that, without indicating in detail the exact measures the Council would adopt—for that it would be hardly possible to do—the address had ably pointed out the advantages which had followed from what the Society had hitherto done, and indicated that they would continue to follow in the same course, and thereby continue to promote the great interests of the industrial arts of the country. He submitted that was the proper course for the Council to take—not bringing forward details, but stating general principles, and also informing them how they had acted up to the present time; and he was sure it would appeal to the feelings of all present, when the Chairman told them that for several years past they had, by lectures and papers, called the attention of the public to the necessity of looking to all parts of the world for the supply of cotton, the serious deficiency in which they now had to deplore. Had the information which this Society furnished been used, and had the advice given been received and acted upon, undoubtedly they now would have had a much larger supply of cotton from other countries than America, and a great deal of the present distress would not have occurred. That was a striking instance to prove that this Society had been carefully occupied in collecting information which was not attended to as it might have been to the great advantage of the country at the present moment. They had also been told that the Council had not attended to the recommendation of the Society with regard to the memorial to the Prince Consort. Surely Mr. Murchison could not have been in the room, or he would have heard it stated in the address that the Council recommended that a bust of his Royal Highness should be erected in that room, and that the necessary resolution for that purpose would be brought before the members; and it would be a source of gratification to the Council if, when that resolution was brought before them, they responded to it by subscriptions liberal enough to erect such a bust as would secure a perfect representation of that great man, and be a credit to the artist who executed it and to those who provided the funds.

Mr. John Dillon begged to recall the attention of the meeting to the object of the resolution before them. It was to express their opinion of the address they had heard this evening, also to express the opinion of this Society upon the general conduct, character and demeanour of the gentleman who had addressed them. It was necessary in a Society like this, in which differences of opinion would exist, that the chairman of their meeting should be a person who united the temper and manners of the gentleman with the knowledge of the scholar. Those qualities Sir Thomas Phillips eminently possessed, and he had brought them into practice this evening, and therefore in that view he should be happy to join in the motion before the meeting.

The resolution was put by Vice-Chancellor Sir W. Page Wood, and carried by acclamation.

The Chairman then presented the Prince Consort's Prize to Mr. J. G. Greenhough, and the Medals awarded by the Council at the close of last session, to the following gentlemen:—

To Dr. F. Crace Calvert, F.R.S., for his paper "On Improvements and Progress in Dyeing and Calico-Printing since 1851." *The Society's Silver Medal.*

To E. C. C. Stanford, for his paper "On the Economic Uses of Seaweed." *The Society's Silver Medal.*

To James Morris, for his paper "On Mauritius: its Commercial and Social Bearings." *The Society's Silver Medal.*

The Secretary announced that on Wednesday evening next, the 26th inst., a Paper would be read "On the Utilization of Peat, with reference more particularly to the Manufacture of Hydro-Carbon Oils," by B. H. Paul, Ph. D.

The following letter has been received by the Secretary:—

Sir,—As it is not improbable that many of the members present this evening (without admiring the attack on the Chairman's address) may think that the doings of the past are more faithfully recorded than the future policy of the Society indicated, and as no member of the Council pointed out the paragraphs referring to the future, excepting the last few lines, which are of a general character, I venture to hope that I may not be considered intrusive if I call the members' attention to those parts of the address which may have escaped their notice.

1. The recommendation of a marble bust to the memory of the late Prince Consort,

2. The hope expressed that His Royal Highness the Prince of Wales will accept the office of President.

3. The opportunity afforded by the renewal of the lease for rendering the building more adequate to the wants of the Society, and the library more easily accessible, &c.

4. The acting on the precedent of 1852 in having no Exhibition next year.

5. The announcement of the papers at the evening meetings before Christmas.

6. The revision of the list of premiums so as best to meet the wants of the present period.

7. The intention of the Council to enlist the services of those members who are willing to take a part in the work of the Society by assigning special departments of investigation to members classified with relation to subjects with which they have been familiarised by their callings or studies.

As an independent member of 33 years' standing, I must express my humble opinion that if the Council are successful in carrying out the foregoing propositions, they will deserve the thanks of the Society, as much as I believe they now do for their past exertions.

I am, &c.,
PHILIP PALMER.

118, St. Martin's-lane, November 19, 1862.

METROPOLITAN ASSOCIATION FOR PROMOTING THE EDUCATION OF ADULTS.

A meeting of managers and teachers of schools, and other friends of education in the metropolis, was held on Saturday, the 8th of November, at the Whittington Club, for the formation of a "Metropolitan Association for promoting the education of adults, in union with the Society of Arts."

The chair was taken by Vice-Chancellor Sir W. Page Wood, Vice-President of the Society of Arts and Member of the Committee of the National School Society. In the course of a most interesting address, he gave a sketch of the past and present provision for the education of all classes of the community, and showed, with reference to the education of the working classes, how exactly the schemes of examination introduced by the Society of Arts, and carried on by its distinguished examiners, and by the various committees, "Local Boards," and other Institutions, of which this Society is the centre, are calculated to supply the very pressing deficiency arising from the very early age at which children of the poor are necessarily removed from their schools. He said that it might be taken as an axiom at the present time that the mind of the people of England was made up to the effect that the education of her people should be as effective and as extensive as possible, regard being had to all the circumstances and positions in which the various classes of society found themselves. The first steps in educating the poorer orders systematically were taken so long ago as the year 1699, at the formation of the Society for the Promotion of Christian Knowledge. In the space of four years from the establishment of that Society they collected about two thousand children in the metropolis, and in about thirty years they were able to collect, at one of their local gatherings, as many as thirty-four thousand in St. Paul's Cathedral. Not much more was done till the expiration of the first decade of the present century, about which time two great societies were formed —the National and the British and Foreign School Societies. In 1838 the Government took up the question, and at the present time one in seven of the entire population instead of one in seventeen, the proportion in 1810, was being educated at school. It was designed by the present movement to fill up a gap and supply a link in the outline or skeleton of the system of education now established in this country, which he believed would make that system a complete one, leaving the outline to be filled up by the earnest and zealous efforts of the friends of education throughout the country. Taking the upper and well-to-do classes of this country he found that the general education of young men was not considered complete till the age of about twenty or twenty-one, when those who were destined to enter professional life generally commenced their special studies. The education of these young men was well provided by the universities and public schools of the land. In the class next below them the education was generally carried on till about fourteen or sixteen years of age, when they were apprenticed to their several callings: but this class had not been properly provided for until the recent movement, which extended the benefit of educated examiners from the universities to them through the agency of middle-class examinations. This movement not only offered a means of testing the progress made by young men themselves, but afforded a sort of guarantee to parents that the schools to which they sent their children were presided over by competent masters. After this class however, there came another, which was provided for by the National and British Schools to a certain extent; but in the great majority of instances the scholars left at a very early age, say from twelve to thirteen, if not earlier. It was for the assistance of this class of young persons that the present movement was set on foot. About ten years ago the Society of Arts resolved to give an opportunity to persons upwards of sixteen years of age to pursue their studies in a great variety of important subjects, and to pass examinations under examiners provided by the Society, and local institutions were invited to put themselves into union with the Society for promoting that object. The results had been of a most gratifying character. Nearly 100 Local Boards for examinations, and a considerable number of minor Unions of Institutions and schools for adults, had been formed to co-operate with the Society of Arts, and many of these boards, on the recommendation of the Society, carried on a subordinate system of examinations of a simple character, suitable for children under 16, and for elder persons whose education had been much neglected. To those who succeeded in these simple examinations they gave certificates and prizes on their own authority; and much good had been the result—many had been thus led on and prepared to succeed in the more difficult examinations of the Society of Arts. There was, however, one disadvantage: that there was no uniformity of standard, and, therefore, no uniformity of value in the certificates issued by those different bodies. To remedy this defect, through the instrumentality of Mr. Best, Mr. Chester, and other friends of education, a new Board had been recently grafted on the Society of Arts. This was called "The Central Committee of Educational Unions in connection with the Society of Arts;" and its object was simply to supply the desired uniformity by preparing annually, and printing, for general use, a set of questions to be answered by the candidates in the various elementary examinations just referred to. This arrangement first came into operation last year, and was found to work admirably. The "Metropolitan Association" now to be founded was to be in union with the Society of Arts, and also with its Central Committee, that is to say it would co-operate with the Society in its examinations, and would use the papers and certificates of the Central Committee in the preparatory examinations for children and backward adults. He was sure that all true friends of the working classes would rejoice to help forward a movement of the kind by becoming members of the Association and otherwise advancing its interests. Of course friends would be needed to carry on its operations; but past experience proved that every judicious effort made to extend and promote useful knowledge was likely to effect the greatest possible amount of good, both in the moral and scientific progress of the classes which were the subjects of such efforts. He believed that the noble fortitude and forbearance of the people of Lancashire under the tremendous affliction which had been befallen them, could be traced to the influence of education. "I verily believe," said he, "that in the history of the world such a spectacle was never before seen,—of thousands of the working population suffering the most acute distress, thoroughly understanding its causes,—not only without the commission of crimes, but without even

asking the Government to do for their relief a single act which might militate against justice, or compromise the honour of their country." The Vice-Chancellor concluded by stating, that although the present movement was set on foot by the Metropolitan Church Schoolmasters' Association, it was perfectly unsectarian in its character and objects.

Mr. HARRY CHESTER moved the first resolution. He explained that the meeting had been called by the Church Schoolmasters' Association, who had found by experience the want of such measures as had been introduced by the Society of Arts to encourage the education of adults. All experience showed that young men and women, after a hard day's work, would not generally pursue continuous and systematic instruction of an evening without some special stimulus. It was not sufficient vaguely to tell them that they ought to improve their minds, but when they were told that, if they would pursue, for a certain time, a definite course of systematic study, selected by themselves from among a great variety of defined courses, they would have an opportunity of being quietly examined in their own localities by competent examiners, who would test the results of their study, and give to them, if successful, a certificate which would be an honourable and useful testimonial, and might possibly be accompanied by a substantial prize, something like a real and effectual stimulus was presented to them. Mr. Chester laid before the meeting, and explained, an outline which he had been requested to draw up for the proposed new Association. It would interfere with no existing agencies, but would help, as far as possible, all the Institutes and evening schools of London, and promote the establishment of such bodies where at present they were wanting. The first object would be to bring the Society of Arts' examinations, certificates, and prizes, within the reach of all parts of the metropolis. To take advantage of this system it was necessary to be, directly or indirectly, through some affiliated body, in union with that Society. A considerable number of the Institutes, and a few of the Evening Schools of London were already in direct Union with the Society of Arts, but there was a great number of poor Institutes and poor Evening Schools which could not afford to enter into direct union with the Society, but would be allowed many of the advantages of the Union if they were grouped together in such an Association as that now to be formed, which would be directly united to the Society of Arts. The education of adults, which he thought the most important part of the whole work of public education, was involved in such difficulties as could not be surmounted by isolated efforts. We must combine all our energies, and hold up each other's hands. The Association would not interfere with the internal government of any Institute or school, but would be ready to help all that desired it. None could be too humble to receive its aid. The Vice-Chancellor had so clearly explained the character of the various Examinations, that it was not necessary to say much more respecting them; but as some of the audience had come late into the room, and might be puzzled between the Society of Arts' Examinations, Previous and Final, and those of the Central Committee and Local Boards, it might be well to clear up those points. The whole system was in connection with the Society of Arts, but the Society did not wish the system to be centralised more than was necessary. It acted everywhere through local agencies, and was desirous to create everywhere local bodies authoritative in Education, because composed of the representatives of educational Institutions. The Society had, 1st, its own Central Board of Examiners, by whom the papers of questions used in the "Final" (or advanced) Examinations were set and adjudged; 2nd. "Local Boards," who first held the "Previous" (or sifting) examinations, and without whose recommendation no candidate could be admitted to the Final Examinations. This was the machinery employed in what he would call the major Examinations, and these were not open to any person under 16 years of age. He would next describe what he would call the Minor Examinations. These were open to any person not under 12. They were of a very simple and elementary character, suitable for children between 12 and 16, and for older persons whose education had been neglected. Two sets of examination papers were provided. They were called "Junior" and "Senior;" but these terms referred to the degrees of simplicity in the questions proposed, and not to the ages of the candidates. A well-instructed child of 12 might select the "Senior," or less simple set of questions; while an old man of neglected education might select the "Junior," or simpler set. Both the sets were prepared by the Central Committee, and printed by the Society of Arts. These minor examinations were held by the same "Local Boards" as had been already described as "sifting" the candidates in the major examinations, and every candidate not under 16, who passed a satisfactory examination in the "Senior" set of papers in the former or minor examinations, might be recommended for examination in the latter or final examinations. The Society's Union extended, and its examinations were held, throughout nearly the whole kingdom. They were held in the spring of this year at 81 different places. Among the places where they had been most successfully established was Glasgow. Glasgow, last spring, presented 139 candidates, who carried off 150 certificates, and prizes amounting to £48; while London, with its immense population, presented only 105 candidates, who obtained 126 certificates, and prizes amounting to £26. The Institutions which, being in union with the Society of Arts, had presented the 105 candidates for examination in London were the City of London College, 55 candidates and 63 certificates; the London Mechanics' Institution, 15 candidates and 21 certificates; the Polytechnic Institution, 11 candidates and 13 certificates; the Evening School of St. Stephen's, Westminster, 15 candidates and 18 certificates; and the evening school of the Rev. W. Rogers, St. Thomas, Charterhouse, 7 candidates and 11 certificates. The City of London College, formerly the Metropolitan Evening Classes at Crosby Hall, had been remarkably successful since it was reconstituted in its present collegiate form. In that Institution a portion of the governing power was reserved to the certificated students. As at the Universities, when a man obtained a fellowship, or took his degree of M.A., he would partake of the government of his College or University, and thus an *esprit de corps* was maintained; so, in the City of London College, a young man, when he had completed his studies there in the classes, did not now break off his connection with it, but retained an honourable position in its management. This was a regulation well worthy to be adopted in every similar Institution. Mr. Chester stated, that a few nights previously he had distributed the certificates and prizes to male and female candidates at the London Mechanics' Institution. The Local Board there had been very successful. He was much pleased to see there candidates coming up year after year, and adding certifiate to certificate. Some of them had received certificates in previous years at other places, at Glasgow, Bradford, and in different parts of London. The system of examinations was applicable everywhere. The certificates in the major examinations were granted under the seal of the Society of Arts, and were recognised everywhere. Those in the minor examinations were issued by the Local Boards on their own authority, but in a form prepared by the Central Committee, bearing on its face the connection with the Society of Arts, and of an uniform value everywhere. The proposed Association was not at all to be confined to members of the established church. He concluded by moving that the Association be now established, and that a Provisional Committee be formed to bring it into immediate operation.

The Rev. Prebendary JACKSON, Rector of Stoke Newington, seconded the resolution. He had listened with intense interest to the admirable review of the history of education furnished by the chairman, and he believed he

was justified in saying that there was at the present time a greater amount of true and sound instruction distributed throughout the length and breadth of England than was found in any other nation on the face of the earth. If there was a quarter of a boy in a hundred or some such fraction educated in Prussia more than in England, we might on the whole believe that English boys had a greater amount of real instruction imparted to them, such as rightfully belonged to the citizens of their free country. It was true that the French workmen enjoyed greater advantages, as to Art education, than the artizans of our own country, but he thought as adult education advanced here, the contrast between the artistic skill of these nations would diminish. One of the greatest anxieties, which every parish clergyman experienced in a populous district, was as to what became of the boys during that critical period between the time when they left school and when they were settled in life. That period was extended beyond what it would otherwise be by the necessity under which many parents laboured of withdrawing their sons from school at a very early age, in order to make them do something to earn their own livelihood; and such boys would be deprived of educational advantages, were it not for the evening schools, and other opportunities of education supplied by such associations as the one it was now proposed to establish. He thought that the collegiate form recommended by the previous speaker was most valuable. It led young men to cherish their connection with the Institution at which many useful lessons had been learned.

The resolution having been agreed to,

SIR THOMAS PHILLIPS, Chairman of the Council of the Society of Arts, moved, "That the said Provisional Committee consist of Viscount Enfield, Sir T. Phillips, Harry Chester, Esq., J. G. Fitch, Esq., Samuel Redgrave, Esq., E. C. Tufnell, Esq., Rev. J. Jackson, Rev. I. Lingham, Rev. W. Rogers, and Messrs. Christie, Day, Ditch, Heller, Ives, and Sales, with power to add to their number, and with an instruction to submit their proceedings to a general meeting of the Association for confirmation at the earliest possible period." He said that there was one circumstance which deeply impressed his mind in reference to the importance of the subject they were discussing. It was stated in the report of the Committee of Council on Education that more than two millions of scholars were now being educated in our day schools; but it was also stated by the Commissioners that not more than five per cent. remained at school beyond thirteen years of age. In many large towns the large proportion of children left at the age of eleven years. It was to be feared, therefore, that unless special means of continuing their education were placed within the reach of these young people, nearly all the good they derived from school would be lost before they attained the age of eighteen. About one-fifth, or four hundred thousand, of the nnmber of children under education went forth into the world every year, and it appeared to him a most serious matter that these young persons should pass eight or nine years of the most critical period of life without those restraints which they experienced at school, calculated as these would be to form and strengthen their character, and fit them for occupying an honourable and useful position in society. The Association which they were forming had an eye especially to these young people, and he could not help thinking that all true friends of education would give to it the most cordial support. He believed that evening schools could only be rendered truly effective by the countenance and support of the classes immediately above those which were intended to be benefited.

MR. JOSHUA FITCH, Principal of the British and Foreign School Society's Training School, seconded the resolution. He thought that the Government aid to night schools would be very meagre on account of their peculiar constitution. The Association now established would supply the deficiency long experienced by practical educationists. It would connect the old scholars with the day school and thus solve a very difficult problem.

On the motion of Rev. CHARLES ROBINS, seconded by Mr. CHARLES BROOKE, one of the Examiners of the Society of Arts, the thanks of the meeting were presented to Vice-Chancellor Wood, for his kindness in presiding over the meeting, and for his valuable services in the chair.

The following are the proposed rules of the Association:—

1. *Title.*—THE METROPOLITAN ASSOCIATION FOR PROMOTING THE EDUCATION OF ADULTS, in union with the Society of Arts, and with the Central Committee of Educational Unions in connection with that Society.

2. The object of the Association is to extend and apply, in the Metropolitan District, existing means and motives for the Education of Adults, whether members of institutes, pupils of evening schools, or other students.

3. By circulars, addresses, visits of organizing officers, conferences, and otherwise, the Association will promote the improvement and establishment of institutes and evening schools and will help them to take advantage of the examinations instituted by the Society of Arts, for persons of either sex, not under sixteen years of age; and also of the elementary and preparatory examinations instituted by the Central Committee of Educational Unions, for persons of either sex, not under twelve years of age.

4. Institutes on payment of ten shillings and sixpence annually, local boards of examinations without payment, and schools on payment of seven shillings and sixpence annually, may be admitted into the Association.

5. Members of the Association will be—*(a)* Life members, *i.e.*, donors of £10 10s. in one sum; *(b)* Annual members, *i.e.*, annual subscribers of £1 1s.; *(c)* Representative members, *i.e.*, representatives of associated institutes, local boards, and schools; *(d)* Certificated members, *i.e.*, holders of four certificates of the first class from the Society of Arts, and subscribing five shillings annually.

6. Every such local board, institute, and school, may appoint one representative to be a member of the Association without payment; and every such institute and school may also appoint one of its teachers to be a member of the Association on payment of five shillings annually.

7. The Association will have a president, vice-presidents, a committee of management, a treasurer or treasurers, a secretary or secretaries, at least one organizing officer with a salary, and such other officers as may be requisite.

8. The Association will have a local board, or such local boards as may be requisite, for holding the "Previous examinations" of the Society of Arts, and the "Elementary examinations" of the Central Committee, and also for superintending the "Final examinations" of the Society of Arts, at convenient places throughout the district.

9. So far as the committee of management shall think it expedient and have the means, the Association will offer prizes for the encouragement of candidates in the examinations, and for essays or other papers on specified subjects, and for collections of natural history, etc., submitted for competition by institutes, schools, or individuals within the limits of the Association.

10. The Association will have, at least, one conference yearly at which the members will be summoned, and representatives of other educational institutions, and distinguished friends of education, will be invited, to attend, for the interchange of experience, and for the discussion of questions affecting the objects of the Association, and the interests of education.

11. The Association will have an annual meeting for the appointment of the committee and officers, the passing of accounts, the reception of reports from the committee, and other necessary business.

12. The president of the Association, the committee by a resolution of a quorum, the chairman of the committee, or any five members of the Association, may require the secretary to summon a special general meeting for a specific object, or objects, at any time, upon seven days' notice.

13. The certificates and prizes awarded by the Association, or (through the Association) by the Society of Arts, will be publicly distributed, at meetings held in the evening, at such place or places as the committee may think most likely to be

acceptable to the successful candidates, and to be conducive to the interests of the Association.

14. The Association will promote the holding of meetings at convenient places throughout the district, to stir up an interest in the education of adults, to make known the objects of the Association and its modes of action, to offer its co-operation, and to strengthen the hands of the promoters of institutes and evening schools.

15. The Association will annually publish a report setting forth in detail the progress, state, desiderata, and prospects of the education of adults throughout the district.

16. The Association will not itself examine candidates in religious doctrine; but the Lord Bishops of London and Winchester will be asked to appoint their own examiners, who may examine in Holy Scripture and the Prayer Book any candidate who may desire to be so examined; and the result of such examination may be stated by those examiners, if the candidate desire it, upon the face of the certificates issued by the Association.

17. The committee of management will consist of the president, the vice-presidents, the treasurer or treasurers, the honorary secretary or secretaries, and not more than twenty other members of the Association.

18. A quorum of the committee will be five members.

19. The committee will elect one of their body to be their chairman.

20. Subject to the forgoing regulations the management of the Association is vested absolutely in the committee.

HENRY H. SALES, Secretary, *pro. tem.*

INTERNATIONAL EXHIBITION OF 1862.

THE INTRODUCTORY LECTURE TO A COURSE ON THE COMMERCE OF THE COUNTRIES REPRESENTED AT THE INTERNATIONAL EXHIBITION.

By Professor Leone Levi, of King's College, London, LL.D., F.S.A., F.S.S., Barrister-at-Law.

The Right Hon. W. E. Gladstone, Chancellor of the Exchequer, in the chair.

The Right Hon. Earl Granville, K.G., was to have presided, but owing to indisposition was prevented. The Rev. Dr. Jelf (Principal of the College), Sir Charles Wentworth Dilke, and other gentlemen connected with the International Exhibition, were present.

It may appear somewhat novel to open a course of lectures on the International Exhibition, in a college devoted to the practical instruction of youth and to the cultivation of science, but truly that great Industrial undertaking did much more than enchant the numerous visitors and dazzle our senses of seeing and hearing. We had there the most enlarged field for the study of experimental science; we had there the practical exposition of problems yet unsolved; of ideas yet undeveloped. The chemist, the mineralogist, the geologist, the mechanical engineer, the philosopher, found there the richest materials for study and reflection, and even the most careless sightseer unconsciously imbibed most valuable and solid lessons, the more memorable because they were embodied in tangible objects. But great as were the labour and thought bestowed on the vast mass of objects presented to our view, some of them of wondrous beauty and enormous intrinsic value, and others, though plain and unattractive, the representatives of extensive national resources, many of the lessons which they would have suggested were in most cases lost for want of exposition and information. We saw and passed by objects which would have awakened many a thought and engaged our earnest attention, had means been afforded to furnish the necessary aid for the better understanding of them. And how much might have been learnt from a careful observation on the absence or on the presence of certain articles in different departments, or from the poverty or richness of each special exhibition. This, however, has been left for us to do, and we are now in the best condition to enter into such a study. Whilst the doors of that great palace were open we satisfied our eyes and fed our imagination; now we can sit down to ponder on what we have seen and to satisfy our craving for more solid food.

We have truly seen a great sight. It was a noble thing to contemplate, and a wonderful thing to realise, such an accumulation of rare and splendid articles from every part of the habitable world. It was a museum richer than that of any European capital. It was a vast and endless succession of shops all dressed in their best holiday attire. It was a promenade such as we have seen in the Unter den Linden or the Tuileries, or other parks or boulevards at their loveliest moments. It was each and all these combined and a great deal more. The eye and the ear were every moment in active exercise. Whilst we were admiring some charming diamond necklaces or the most beautiful prisms, we were listening to the most exquisite music. And what taste was exhibited in the preparation of even the smallest department of industry. How neat, how clean, how marvellously planned everything seemed to be. Who could once traverse that magnificent nave without acquiring impressions not easily effaced and lessons of a most practical character! Well may we rejoice to have had an opportunity of seeing such a sight, and well may we congratulate ourselves, and even the industrial world, that notwithstanding all the fears and forebodings once entertained, and in spite of the many untoward events which seemed to thwart the execution of the noble project, this great International Exhibition has gone through with such a remarkable success.

There was, indeed, one great want this year as compared with 1851—it was the absence of his Royal Highness the Prince Consort, the head and life of the parent Exhibition. In his death the Exhibition of 1862 lost its best supporter and warmest friend, and with him, too, we lost the noble pageantry which lent to the ceremonials of 1851 so great a lustre. What an impressive lesson of human frailty was afforded by the loss of that great and good man at such a moment. There he was, heart and mind wholly given to this Great Exhibition. He would see all the plans. To him the final choice was given of all the designs. Many a time he went to inspect the works, and many were the hours he spent at Colonel Fowke's studio. The Royal Family, not less than the humblest Londoner, anticipated the 1st of May with the utmost delight, and everything seemed to approach a ceremony as brilliant and delightful as that which the cartoons of 1851 still bring fresh to our eye. But my friends, man proposes, and God disposes. May came, the Exhibition came, the splendid weather came—but there was death in the Palace, and he who would have been at the acme of his triumph was ere this consigned to the silence of the tomb.

Of Exhibitions there have been many in France and this country. As far back as one hundred years ago, in 1761, an exhibition of machinery was held in the rooms of the Society of Arts. In 1828 there was an exhibition of specimens of new and improved productions of the artizans and manufacturers of the United Kingdom in the King's-mews, at Charing-cross, and one year after the Royal Dublin Society adopted the plan of Triennial Exhibitions of specimens of native industry. In 1845 there was an exhibition of manufacturers at the Free Trade Bazaar in Covent Garden Theatre. And for many years an exhibition of inventions was held in the rooms of the Society of Arts, and many local exhibitions had been successfully carried out in Manchester, Birmingham, Leeds, and Liverpool. But it was not till 1849, when the country first adopted a liberal commercial policy, and when the sounds of freedom of industry echoed from every quarter, that the Society of Arts, animated by its illustrious President, gave forth the magnificent idea of an International Exhibition, comprising all branches of industry, and from all nations of the world. It was a glorious event which thus inaugurated the latter half of the nineteenth century. By it we have made greater strides in the arts of peace,

civilisation, and science, than had been achieved for ages past. And it essentially departed from the narrow limits of former exhibitions, inasmuch as leaving the commercial bearing to the care of the exhibitors themselves, it first originated that noble idea of procuring a true test and a living picture of the point of development at which the whole of mankind had arrived, and a new starting point from which all nations may be able to direct their further exertions. Truly in this age, when events succeed each other with such rapidity, scarcely leaving any traces of heir passage, we do require some outstanding monument which shall denote the periodical limit of human advancement. In morals nothing is more difficult than to ascertain the nature and extent of progress from one period to another. The transition is generally so slender and uncertain; the dark pages of crime and social wrongs so often burst out upon our view after their long disappearance, that we can scarcely say whether or not and at what time any decided improvement has become conspicuous. Happily in industrial and mechanical art we are now enabled to determine, with a tolerable amount of precision, what has been achieved in different countries. We can mark their shortcomings, and we can trace the causes which retard their progress.

The decided success which attended the first Exhibition encouraged the United States and France to undertake similar efforts. But, truly, exhibitions like these, projected on so gigantic a scale, can only be successful in great and populous capitals. It must be in a country rich within herself in those articles which constitute the chief attractions of the Exhibition, where there exists abundant peace and security, and where the government is not only of a progressive character, but influential in the council of nations. And there is no capital which can be compared to London in all these requisites. Here we have a population of nigh 3,000,000, spread over a wide surface of some twenty miles, mighty railways pouring in daily large streams of visitors, and superabundant house accommodation. And here we have merchant princes luxuriating in wealth and splendour; a nobility rich and enlightened; and, above all, a most gracious Queen, who reigns in the heart of her people, and who is ever foremost in fostering national greatness. No wonder that an Exhibition of this kind succeeds here better than could succeed in any other capital.

As the decennium was advancing from the famous 1851, the Society of Arts made preparation for another great Exhibition. At first 1861 had been fixed for the purpose, but owing to the war in Italy, it was delayed till 1862. Whilst the proposal was under discussion, there were not a few who doubted the expediency of having another such Exhibition so soon after those of London and Paris. It was questioned whether the progress would be sufficiently marked during the interval; whether foreign countries would respond to the appeal; above all, whether it would be able to defray its own expenses, seeing that there was no longer any novelty in the project; and that we have constantly such splendid exhibitions of rarities in the Kensington Museum and Crystal Palace. In answer to these objections, it was stated that our commerce has nigh doubled in the decennium; that our colonies have immensely increased in civilisation, industry, and commerce; that foreign countries were more alive than ever to the advantage of such Exhibitions to industry and art; that in this era of progress, 10 years are as fruitful of inventions and improvements as 20 or thirty years would have been in former times, and that as it was contemplated to add an exhibition of painting and sculpture, this would impart sufficient novelty to secure a brilliant success. Then came the question, what improvement can be suggested upon the general management of the Exhibition. Should the geographical distribution of articles be adhered to, or should we have all articles exhibited under certain classes? We can well imagine that nations making great sacrifices, in order to exhibit their industries in the best possible manner, will object to their being mixed up and re-distributed into classes. Nor is it unimportant to animate this spirit of nationality, and to have a distinct exhibition of the productions and manufactures of each country; yet we doubt whether the geographical arrangement is by itself best adapted to exhibit the improvement made in manufactures, the development of taste and skill in different departments of industry, the uses and adaptation of new products, and the thousand other objects which science and art have brought to light in recent times. A combination of the geographical and classified distribution is certainly a great desideratum for future exhibitions.

And what is the best classification? Most difficult it must be to classify such a multitude of objects, differing so widely from one another. When, at the Statistical Congress, we endeavoured to establish a common classification of crime, and a common nosological table of the causes of death, we found, not only that each country had its own predilection for a certain classification, but that we wanted the first essential for any classification—a common nomenclature. Various methods have been suggested for the classification of articles of industry. The French Exhibition of 1827 was divided into five divisions, viz., chemical, mechanical, physical, economical, and miscellaneous art. In 1837 the classification adopted was—alimentary, sanitary, vestiary, domiciliary, locomotive, sensitive, intellectual, preparative, and social. In 1844 the objects were classified as woven, mineral, mechanical, mathematical, chemical, fine art, ceramic, and miscellaneous. And in 1851 the whole was divided into four great sections, each including a certain number of classes, viz., raw materials, machinery, manufactured goods, and works of fine art. Some modifications were introduced on this classification in the Paris Exhibition of 1855, but this year we returned to that of 1851, with the addition of photography and a department for educational works and appliances. This classification takes, first, all that is produced under the earth and over the earth, viz., mineral, chemical, and medical products, substances used as food, and animal and vegetable substances used in manufactures; next, machinery for expediting communication and transport, and machinery for lessening manual labour in all departments of industry; next, all articles having reference to building, engineering, and architecture, civil, naval, and military; next, the instruments by which we measure space, mechanical and physical forces, or illustrate the laws of mechanical and physical science; next, the instruments by which we measure and register time, modulate sound, and employ in surgical purposes; and after these the raw materials and their manufactures. The principal object of a good classification is to afford ready means of finding any article of human industry from the vast multitude of objects, by enabling the student to search for such objects under that class which the mind would readily suggest as their appropriate place; to facilitate the labour of the juries in comparing the merits of the same articles exhibited by different countries; and, practically, to introduce order and clearness in what would otherwise be a chaos of confusion. I shall offer no criticism on the classification now adopted, but seeing that Exhibitions of this nature will periodically be held, it may be desirable for Her Majesty's Commissioners to appoint an International Commission to report on the subject.

Any attempt to analyse the immense collection of articles exhibited in this vast edifice, whether geographically or according to classes, must necessarily prove most imperfect. It is a weighty matter to think that we had the industries of the world before us; that the most eminent personages and most scientific men in all countries were engaged in selecting articles for the Great Exhibition. It is possible that some choice products have never found their way to the magic building; that many wonderful discoveries have been purposely kept back; but we had sufficient evidence before us that the Exhibition did represent at least the bulk of what is manufactured and

produced in this Anno Domini 1862. As might be expected, Britain is first among the exhibiting countries. The Exhibition was at our door. England's supremacy in manufacturing industry has long been established, and she could naturally muster a great deal upon every branch of industry. In metals she exhibited the finest specimens of iron manufactures, not only in common bars and rails, but in statues, fountains, and gates, sparkling steel and cutlery, and ores in abundance. England had the largest number of exhibitors under this class, exceeding the number of any other country. And so in machinery. Continental nations may be advancing, but Britain is the seat of mechanical power. The woollen and cotton manufactures were well represented, and so the linen and silk. It was pleasing to see the special productions of Leeds, Bradford, Manchester, Glasgow, one by one so tastefully arranged; here the thickest broad-cloth, there the splendid muslin; here Nottingham laces, there Spitalfields brocades and ribbons, whilst the calico shone in all its purity, notwithstanding the temporary dearth of cotton. England has made rapid advance in late years. Open competition animates her efforts, and she has energy, capital, and strength sufficient to face all obstacles. Very close to Britain were her colonies; India excelling in her rich and costly articles, in the fineness of her materials, and in the abundance of her produce; Victoria, and the other Australian colonies, prominent for their golden treasures and their wool; Canada, with her timber trophy, and one and all exhibiting the sources of immense wealth as yet but imperfectly developed.

France, our nearest neighbour, our successful rival, contributed much to the success of the Exhibition. She is singularly rich in agricultural produce, in chemical substances, in the finer manufactures of wool and silk, and in industrial art generally, such as porcelain, gold and silver ornaments, articles de Paris, tapestry, &c. Next in importance is Germany. Prussia had a splendid collection of minerals; her woollen goods were abundant. Austria exhibited extensively under every class, but the other German States made an inferior show, owing to the unfortunate subdivision of their exhibitions. With a vast variety of articles, some of which were of great worth and beauty, the exhibitions of these States were not conspicuous enough to show to advantage. It would be of vast importance to Germany if she could exhibit her productions and manufactures as a whole; if the various states would consent to merge their exhibitions into one great mass, according to the respective classes. Italy, notwithstanding the difficulties of her infantile position among the great powers of Europe, has sent a fair representation of her rich and varied productions. Under the first four classes she exhibited largely, whilst her courts were thronged by admirers of her sculpture and works of art. Spain and Portugal abounded in articles of food, minerals, and vegetable substances, though they were both imperfectly represented in other branches, and their manufactures showed but little advance. Russia exhibited but little, when we consider the extent of her territory and the productiveness of her land. How much must she yet accomplish in order to enter in a successful competition with other European countries? Denmark, Sweden, and Norway were rich in metals. Switzerland excelled in watches and cotton manufactures. Belgium abounded in lace, and was rich in minerals and woollen cloth. The American States were but imperfectly represented, the United States making only a fair exhibition of their machinery. Brazil, Costa Rica, Venezuela exhibited under a few classes only. Asiatic produce was seen under Japan, China, and India, and there was a corner for Liberia, in Africa.

And now that we have the world's industries before us, what do we see in them? The International Exhibition differs essentially from fairs, bazaars, and other meeting-places for buyers and sellers, inasmuch as it is not limited to those articles of trade which each country can offer to the commerce of the world, but is a miniature representation of the state of industry of each country. In some cases we had the entire costume of the inhabitants. In others we had their household economy, and in others correct and even photographic views of the institutions of the country. And as the industries of nations are primarily intended to satisfy the local wants of each country, and are necessarily adapted to the climate, habits, and fashions which prevail in different states and among different races and nations, it is natural to find that much that is produced or manufactured in them would be unfit for any other country. But the question is naturally suggested, do such productions or manufactures suffice for the wants of such inhabitants? Here are 60,000,000 Russians, there some 300,000,000 Chinese, and there some 200,000,000 Hindoos. We have some ideas of the wants of man, of the comforts he needs, of the requirements of civilization! Do they possess at home all they need, or would they not be thankful for our cotton or for our linen, for our tools or for our cutlery? As we traverse the various courts of this vast Exhibition, we are not long in finding out that if most countries are wanting in some things, each and all possess some special productions which are greatly in excess of their own wants. Nature has provided each country and district with a different source of material wealth, and it is most important that we should obtain a clear idea of the varied productions of each country in order that we may resort to them for those articles in which we are deficient. But it is not enough to have a certain capacity for producing. Nature, it is true, offers its powers and its products, but industry and labour discover their various and latent utility, and surmount the difficulties of obtaining such products and of giving them the requisite modifications; hence the need of inquiring to what degree of perfection has each country brought its own productions and manufactures, what contrivances have been introduced in order to develope such natural riches, and render them available to the wants of man. Lastly, another inquiry not less essential is, what quantities are produced of such articles? The cereals, for instance, are produced almost everywhere. But how few countries have any excess of them for exports. The productive power of a country is not sufficiently exhibited by the samples it exhibits. The physical riches are valueless unless the economical conditions of labour are carefully fulfilled. But truly a bare inspection of the vast materials exhibited would never enable us to answer these important questions, and we are thankful for the labour of those juries who, with special knowledge and experience, have undergone the arduous task of testing the merits and other claims of the productions and manufactures of each country. To these reports, therefore, I direct your attention. Whilst in the catalogue of each country you may possess an indication of the special resources and industries of nations, in these reports you will find a correct appreciation of their worth, and what more interests us, their comparative merits and progress. As an illustration, take the two classes in which we are more deeply interested—the minerals and textile fabrics. The Exhibition abounded in samples of minerals. As many as fifty-four countries have come forward as Exhibitors under this class. The splendid discoveries of gold in California and Australia, and the extension of railways, have greatly encouraged mining adventures, whilst the extension of geological studies, as evidenced by the magnificent maps exhibited, has rendered such adventures more certain and reliable. Seeing all this, we might conceive that our coals and our iron would indeed no longer be required for exportation. But the juries tell us a very different story. Whilst this country produces as much as 80,000,000 of tons of coals, France at most produces 7,000,000 tons, and Prussia, 15,000,000 tons; and whilst Britain produces 4,000,000 tons of iron, France produces 1,000,000 tons only. But what really constitutes the great superiority of our mineral wealth is rather the contiguity of the coal and iron mines, and the great facility of transport which we possess.

These facts, however, are not apparent at the Exhibition, and we must apply to other sources for such particulars. Immediately attached to iron and metals are the machinery. The contents of the western annexe were truly one of the greatest attractions to the Exhibition. We all admired the beautiful contrivances—the precision of workmanship—the efficacy of steam power—the vastness of design which such machines exhibited; but they seem to have attained a state of perfection admitting but little further progress. The juries tell us that, as compared with the Exhibition of 1851, there was much less originality of invention, or introduction of new principles, than improvements of details, workmanship, and material. The results of the exhibition of textile fabrics were not less important. Great was the anxiety of our manufacturers as to the probable consequences of a free trade policy. In silks, especially, the competition of France was much dreaded, and not a few prognosticated most disastrous results. The Exhibition has brought the manufactures of Lyons and Spitalfields in close contact, and competent judges have pronounced that a much greater advance has been made by this country than by France during the last ten years, and that with an improved taste, with better materials, and finer colours, our manufacturers can produce ribbons and other silks of merit quite equal to the French. In woollens France stood higher than England. France stood first for woollen shawls and flannels, Britain for worsted and mixed fabrics. The cotton manufacture showed little improvement since 1851, but the inadequate representation of this manufacture rendered it difficult for the juries to make a full comparison of the respective merits. Universal exhibitions, said the juries, would lose a considerable part of their usefulness if the great manufacturers of every nation did not feel it to be their duty to associate together and take their part in the work of improvement, which such exhibitions cannot fail to effect, by sending specimens of their several productions.

From what has been stated, it will appear that nothing could be more important for the successful issue of such exhibitions than the appointment of men of knowledge and experience in each branch of industry, whose duty it is to report on the comparative merits of the various productions, and point out the special characteristics of each industry. But their duties have not been confined to a mere report. Their labours have been directed to reward exhibitors for their success as an encouragement for further exertions, and we have seen a great machinery set up for awarding medals and honourable mentions. It would be interesting to sift the motives which led so many thousand manufacturers, artists, and producers, from the most distant quarters of the globe, to send hither their products and manufactures. In some countries, as in England, the exhibitors came forward spontaneously without any pressure or invitation on the part of the Government. In other countries, and in the colonies, the Government took the initiative, and assumed a great portion of the expense and responsibility, but in all cases the exhibitors incurred great risk, and made positive sacrifices of time and labour, and not a few purposely produced their articles for the Exhibition. It would be idle to suppose that in so doing they were animated by purely philanthropic motives, or by the desire to contribute to an industrial festival likely to promote the interests of civilisation and commerce. Their principal object was to gain reputation and to attract custom. To them the Exhibition was a gigantic advertisement. And when we add the expectation of receiving medals which shall signalise their productions, and set them before the world as models of beauty, excellence, or cheapness, we may well conceive that it was not for nought that they embarked in the undertaking. To inventors, men of genius, enterprising men, such exhibitions are golden opportunities. A medal is to them little short of a patent. The judgment of the jury, the approbation of an appreciating public, are the making of their fortunes. Yet I cannot help thinking that the present system of awarding medals to successful exhibitors is, on the whole, far from beneficial or satisfactory. We shall not enter into the principles which should regulate the awarding of medals or honourable mentions. But we must consider that the principal aim of these exhibitions is to mark the progress of nations in industry and art, for which purpose we require the co-operation of those who have taken the largest part in such a progress, and who are, on that very account, careless of such awards. We must have regard to the difficulty of ascertaining which article has the merit of absolute superiority among so many produced under different circumstances. And we must bear in mind that, independently altogether of the awards of the juries, the exhibitors derive abundant advantage from the judgment of the press and visitors, and from the publicity which they obtain for their manufacture and industry.

There is one aspect of such exhibitions which is of the greatest interest, that is, the recognition of the artist and producer as distinct from the merchant. The principal object of such exhibitions is to call forth a universal competition and emulation among the artists of the world. What a wonderful influence it will have in stimulating their powers and leading them to excel both in the conception and execution of their industries. The powers of the human mind, the prodigies of genius, lie embedded in man like the geological strata under the surface of the earth. We must dig deeper and deeper to discover its riches. Whatever stimulates us to exercise our powers, whatever compels us to search the treasures we possess within ourselves, engrafts a new life on our being. And of all other motives emulation is the most likely to effect this wonderful transformation. When powerfully excited, and for lofty purposes, it is a most potent agent in human improvement.

We may well expect that an emulation so powerfully excited may give a great stimulus to inventions, and that very many new ideas and new contrivances may yet be brought to light; but remember that such systems of exhibitions trench more and more into that secresy which heretofore formed the chief capital stock of inventors. It becomes, in fact, their interest to bring to light whatever discovery they may have made, so that they may also obtain the benefit of the advance made by others in the same path. And thus inventions which would have required years and years to perfect and render available, are now, by the mutual aid of the inventors of all countries, brought speedily to practical use. How far such a revolution may affect the Patent Laws, and render their abolition an absolute necessity, we cannot now inquire. And how great and beneficial is the influence of such exhibitions on general commerce. They supply primarily that amount of knowledge of the special products of each country without which no commerce can ever be undertaken. By means of communication, it is true, the productions of the world are now easily surveyed, yet not a few natural products or manufactures escape notice, and are thus allowed to lie dormant or wasted. Exhibitions like these often show the varied uses made of well-known materials, and are thus the means for opening up and extending many branches of trade. But principally they become valuable as the exponent of the true laws which regulate the commerce of the world, leading nations to alter their tariffs, and to allow industry to advance unshackled by any artificial restrictions.

Two important additions have been made in this Exhibition, of an eminently educational character, which deserve special notice. One is the magnificent collection of paintings, the other the department for educational works and appliances. The Royal Commissioners justly estimated the educational bearings of such Exhibitions when they added these two departments. Nothing could be better devised to refine and educate the taste of the nation than such an exhibition of the Art Treasures of all nations. A chaste and correct taste in painting influences materially the civilization and morals of a country.

Would that the cheap prints which hang over the fireplaces of the people were evidencing greater abilty of design, greater adherence to the works of nature, greater love for the beautiful and higher and nobler themes for their subjects. Would that we could multiply copies of these masterpieces of art so as to bring them within the reach of the masses of the people. The department for educational works and appliances is, indeed in some respects foreign to the objects of this great Exhibition, inasmuch as it enters into the study of the processes which lead to such results as the International Exhibition itself. It trenches on the science of morals, inasmuch as it indicates the works written to awaken the moral sense, to inculcate notions of duty, and to brace up the energies of a nation. It is a step towards an exhibition of the moral, religious, social, and philanthropic institutions of nations, which certainly did not enter in the plan of an exhibition of industry. There is no objection to such an extension. But that it may be successful it would be necessary to provide means for discussing the bearing of such models and appliances; to bring out the lessons which they suggest, and to indicate the result to which they lead. These cannot be so well taught by the eye. These works and appliances do not speak for themselves as a piece of sculpture or an article of industry. The value of the Educational Exhibition set on foot by the Society of Arts in 1854, drew its importance and value from the public lectures and conversational meetings which were held daily during the long period, and which had the effect of directing the attention of teachers in a systematic way to the various material helps of which these works were susceptible, and affording means for the discussion of methods and for friendly conference on the principles of teaching. The same want was indeed felt as regards sanitary improvements and construction. A great deal more, said the juries, is known respecting these objects than was seen in the shape of actual models at the Exhibition. Of new ideas of a purely sanitary kind there were absolutely none, although since 1851 the subject has grown widely. We know more of the condition of the air, we know more of the necessity of ventilation, and more of its difficulty, but the progress of our knowledge has not been seen in the Exhibition. Thus far we see a defect in it; the whole circle of human invention has not been exposed to view, and room is made for improvement in a future exhibition.

But what improvement can be suggested? It is the combination of mind bearing upon matter; it is the affording an opportunity for an expression of the wants felt and side by side with the provisions made for supplying them. Why should not the Society for the Encouragement of Arts, Manufactures, and Commerce, the Chambers of Commerce, the British Association for the promotion of Science, the National Association for the promotion of Social Science, the Universities, and Mechanics' Institutes, our Philanthropic Associations, and as many other foreign institutes and learned bodies hold special congresses on such occasions? Why should we not invite to the inspection of such a collection of works of art, industry, and science, men from all nations, who have devoted their talents and energies, and who have in any way developed any one of the great improvements by which our age is distinguished? A wonderful amount of intelligence was manifested in the numberless articles exhibited; most of them the works of the human mind, which exercises choice and volition, which can abstract and combine ideas, which can understand, reason, imagine, remember, and which has complete sway over all the bodily powers; yet the work of men acting singly in their homes, or in factories, often at great distances from each other, and without guides or instructors. Who can say how much more rapid would be our progress, if, on occasions like these, we could direct the most powerful minds of all nations to the consideration of the steps necessary to further improvement?

The introduction of machinery, railways, telegraphs, gas, and steam power, and the wonderful discoveries of chemistry, have all contributed mightily to human advancement. But much remains to be done, and means are at our hand for hastening great results. Let us, ere another International Exhibition comes, seek to bring about a greater recognition of the true economical principles in trading and industry among all nations; a greater adherence to a policy of peace and non-intervention; the adoption of higher principles in the law of nations; the removal of the differences still existing in the mercantile laws and in the weights, measures, and coins of all countries; the introduction of a common scale for the thermometer and barometer, and a common meridian for the measurement of longitude. These are only a few measures, yet each of them of mighty importance and pregnant with great results.

It is time, however, to bring these observations to a close. For months past we have seen the worshippers of human productions, ourselves among the number, crowding the courts of that vast edifice where the utmost of human ingenuity has been displayed, and we have heard nothing but expressions of wonder and admiration. But oh, how trivial do these Exhibitions appear when we place them side by side with the works of God! What, after all, can human mind and human hands do but make some feeble attempts to fathom His works? What are the glorious results of science but the discovery of those laws which He has established, or the properties of those numberless objects which He has created? Compare these toys of human production with a range of lofty mountains, the wide ocean, the starry heaven, the beauteous sun, or the fairy moon; compare them with the wonders of the animal or vegetable world constantly before our eyes. Thankful, indeed, we should be that we are endowed with wonderful powers and ability; that we are enabled to attain so much knowledge, and embrace so many objects. But oh, what are we to Him who is wonderful in counsel and excellent in working, to Him who doeth great things, and unsearchable, marvellous things without number?

Yet another observation, and I have done. The nations of the earth have once more responded to our appeal to exhibit their heart and industry. Once more have we seen men of different races and climes fraternising together in the great work of industrial progress. States which once never met but for mutual slaughter are now united for their mutual welfare. Never was the dependence of nations on each other's produce and industry made more palpable; never were the distinctive characteristics of each State made more conspicuous than in this Great Exhibition. We are now about to separate. The splendid articles which cemented this precious bond of brotherhood are about to be scattered. Will they leave no lasting impression on our international relations? Shall we allow the kindly sentiments, now happily engendered, soon to die away? I trust not; I have faith in the great designs of the Almighty. What are these railways, telegraphs, steam-packets, treaties of commerce, free navigation, free trade, and International Exhibitions, but so many steps in the great ladder, so many links in the great chain, of human unity. May we ascend this ladder higher and higher, and abandoning for ever those jealousies and rivalries which have neutralised the best designs of human creation, and thwarted the kindly purposes of a gracious Providence, realise the great fact that in truth and in deed our truest interest is to contribute to one another's good.

The Chancellor of the Exchequer, in thanking the lecturer for his admirable and eloquent lecture, said it was hardly necessary to do so after the hearty and spontaneous tribute which had been paid by the audience; but in giving articulate expression to his and to their gratification, he could say that it was not a mere ceremonial on his part, but that it having been his lot in life to be brought into communication with those who represented industrial and mercantile interests, he felt deeply and warmly the eloquence of language, the justness of thought, and the

TABLE OF THE NUMBER OF EXHIBITORS OF EACH COUNTRY UNDER THE DIFFERENT CLASSES OF THE INDUSTRIAL DEPARTMENT OF THE INTERNATIONAL EXHIBITION.

COUNTRIES.	1 Mining, Quarrying, Metallurgy, and Mineral Products.	2 Chemical Substances and Products, and Pharmaceutical Products.	3 Substances used for Food.	4 Animal and Vegetable Substances used in Manufactures.	5 Railway Plant, including Locomotive Engines and Carriages.	6 Carriages not connected with Rails or Tramroad	7 Manufacturing Machines and Tools.	8 Machines in General.	9 Agricultural and Horticultural Machines and Implements.	10 Civil Engineering, Architectural, and Building Contrivances.	11 Military Engineering, Armour and Accoutrements, Ordnance, and Small Arms.	12 Naval Architecture. Ships' Tackle.	13 Philosophical Instruments, and Processes depending upon their uses.	14 Photographic Apparatus and Photography.	15 Horological Instruments.	16 Musical Instruments.	17 Surgical Instruments and Appliances.	18 Cotton.
United Kingdom	444	207	161	242	85	117	236	246	138	191	141	172	162	147	97	90	124	57
India	40	18	66	122	...	1	5	2	4	...	13	3	2	5	...	3	...	26
British Colonies...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Africa, Central and Western ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Belgium	34	21	76	57	15	4	40	18	14	21	22	1	8	8	1	8	4	41
Brazil	16	6	73	31	...	...	1	...	1	...	3	4	2	2	1	...	1	13
China	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Costa Rica	1	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Denmark...	3	13	41	33	...	2	6	1	2	4	2	9	4	6	5	12	3	1
Ecuador	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
France	97	149	565	56	32	16	55	96	43	50	43	16	62	119	54	67	59	44
French Colonies	13	11	102	1	...	...	...	...	1	...	...	1	...	...	...	...	...	2
GERMANY :—																		
Austria...	81	90	232	139	7	2	13	25	21	21	14	3	21	12	10	42	8	24
Anhalt Bernburg	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Anhalt Dessau Cothen ...	...	1	1	1	...	...	...	1	...	...	1	...	...	...	...	...	...	...
Grossherzogthum Baden ...	2	5	30	...	...	...	...	2	...	...	...	...	1	1	26	1	...	3
Bavaria...	6	13	9	4	1	...	2	2	1	3	1	...	4	2	1	6	1	1
Brunswick	...	...	1	...	...	...	...	1	...	...	1	...	1	...	...	1	...	...
Frankfort-on-Maine	...	2	2	2	...	...	...	...	...	...	...	...	1	1	...	1	...	...
Hanover	5	10	3	6	...	...	2	1	...	4	6	...	2	...	...	2	...	1
Hesse-Cassel	...	2	...	1	...	...	...	1	...	...	...	...	2	...	...	...	...	...
Duchy of Hesse	2	12	21	18	...	1	...	7	...	...	2	...	2	1	1	4	...	...
Lippe	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Duchy of Luxemberg ...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Nassau	6	1	7	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
Oldenburg	1	...	1	2	...	...	1	...	...	...	1	...	...	...	...	...	1	...
Prussia...	237	68	104	72	10	3	10	30	4	33	14	...	19	14	6	19	9	13
Saxony and Reuss	3	9	2	4	1	...	6	2	...	...	1	...	6	2	4	12	...	22
Grand Duchy of Saxony ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Saxe-Altenburg	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...
Saxe-Coburg Gotha	...	1	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...
Saxe-Meningen	...	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Schwarzburg Rudolstadt ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Schwarzburg Sondershausen	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Waldeck	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...
Wurtemberg	...	14	12	12	...	...	6	2	3	4	1	...	3	1	4	12	...	10
Mecklenberg-Schwerin ...	...	1	12	7	...	1	...	1	1	1	1	1	2	1	1	1	2	...
Hanse Towns: Bremen	...	1	3	...	...	...	1	1	...	...	...	1	...	...	...	...	...	...
Hanse Towns: Hamburg	2	7	10	5	...	1	6	1	...	1	...	2	2	...	3	13	3	...
Hanse Towns: Lubeck	...	1	5	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
Greece	18	7	121	64	...	...	1	2	...	5	2	...	...	2	...	...	...	6

COUNTRIES.	19 Flax and Hemp.	20 Silk and Velvet.	21 Woollen and Worsted, including Mixed Fabrics.	22 Carpets.	23 Woven, Spun, Felted, and Laid Fabrics, as Specimens of Printing or Dyeing.	24 Tapestry, Lace, and Embroidery.	25 Skins, Fur, Feathers, and Hair.	26 Leather, including Saddlery and Harness.	27 Articles of Clothing.	28 Paper, Stationery, Printing, and Bookbinding.	29 Educational Works and Appliances.	30 Furniture, Paperhanging, and Decoration.	31 Iron and General Hardware.	32 Steel, Cutlery, and Edge Tools.	33 Works in Precious Metals and their Imitations, and Jewellery.	34 Glass for Decorative and Household Purposes.	35 Pottery.	36 Toilet, Travelling, and Miscellaneous Articles.	*Total number of Exhibitors under each Country.*
United Kingdom	81	60	233	43	50	81	69	136	204	222	222	262	408	125	90	78	70	31	5222
India	8	27	20	20	4	18	7	4	11	7	5	12	10	6	24	1	9	20	523
British Colonies...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2209
Africa, Central and Western ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	64
Belgium	82	4	89	5	3	45	13	24	21	31	5	26	43	6	5	15	5	...	815
Brazil	3	1	2	...	...	...	2	9	15	6	...	14	11	2	3	3	4	1	230
China	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	26
Costa Rica	...	...	...	1	...	...	1	1	1	...	...	...	...	...	1	...	...	1	10
Denmark...	1	...	11	5	1	8	6	9	17	10	13	23	13	...	15	1	5	...	285
Ecuador	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	22
France	26	168	183	10	56	62	12	62	170	140	28	78	163	41	74	38	38	67	3039
French Colonies	1	2	1	4	...	...	1	5	9	4	...	6	...	...	...	...	...	...	164
GERMANY :—																			
Austria...	22	29	136	4	21	20	17	23	72	30	63	23	56	59	22	23	10	16	1411
Anhalt Bernburg	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3
Anhalt Dessau Cothen ...	...	1	3	...	2	...	...	1	1	1	1	...	1	...	...	...	...	...	16
Grossherzogthum Baden ...	8	1	...	...	...	...	2	3	...	1	...	1	2	1	1	1	...	...	92
Bavaria...	1	2	1	...	1	1	...	2	2	16	4	8	21	...	1	5	3	3	128
Brunswick	...	...	1	...	...	...	...	...	...	2	...	1	2	...	...	...	...	...	11
Frankfort-on-Maine	...	...	...	1	...	1	...	6	2	2	2	2	1	...	2	...	...	...	28
Hanover	3	...	3	1	...	...	1	3	8	10	...	4	4	3	...	1	...	...	83
Hesse-Cassel	...	...	2	1	...	...	2	...	...	...	3	...	1	...	1	...	2	...	18
Duchy of Hesse	...	...	4	...	...	...	...	12	6	8	4	7	4	1	...	...	...	8	125
Lippe	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	5
Duchy of Luxemberg ...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	6
Nassau	1	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	18
Oldenburg	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	9
Prussia...	33	26	116	9	7	9	15	22	38	58	25	36	65	16	12	13	14	19	1198
Saxony and Reuss	4	...	67	5	7	7	...	5	15	16	3	8	5	1	2	...	8	...	227
Grand Duchy of Saxony ...	...	...	...	...	...	...	...	...	1	...	1	...	1	...	...	...	...	...	3
Saxe-Altenburg	...	...	1	...	...	...	1	1	...	...	...	1	...	...	...	...	...	...	7
Saxe-Coburg Gotha	1	...	...	...	1	...	...	1	1	...	5	1	1	...	...	...	2	2	18
Saxe-Meningen	...	...	1	...	...	...	...	1	...	...	1	...	1	...	...	...	5	...	12
Schwarzburg Rudolstadt ...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1
Schwarzburg Sondershausen	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	3
Waldeck	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Wurtemberg	7	2	11	1	...	6	...	10	22	8	11	7	13	2	9	...	2	...	195
Mecklenberg-Schwerin ...	1	...	...	...	...	1	...	3	3	3	1	4	...	...	...	1	...	5	55
Hanse Towns: Bremen	1	...	...	...	...	2	...	1	11	1	...	5	1	...	2	...	...	5	36
Hanse Towns: Hamburg	...	...	...	1	1	1	...	5	5	8	1	37	10	1	1	3	2	6	139
Hanse Towns: Lubeck	...	...	...	...	...	1	...	...	1	1	1	1	...	...	...	...	...	1	13
Greece	...	5	1	11	...	10	3	4	18	3	2	9	1	...	1	...	...	...	296

Hawaiian or Sandwich Islands	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Hayti	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Italy	181	111	519	326	10	1	22	15	51	38	35	1	19	9	4	13	19	21	26	148	21	6	6	27	7	48	52	37	93	93	45	22	40	14	17	2	2099
Ionian Islands	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	177
Netherlands	2	24	47	24	...	5	2	5	10	12	2	3	10	2	1	4	4	4	13	1	11	3	2	6	10	2	8	17	3	19	12	...	5	2	8	1	284
Japan	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12
Norway	23	11	23	6	...	4	4	4	7	2	5	11	3	1	3	3	3	8	6	...	3	4	...	2	2	13	13	11	6	2	11	2	3	...	1	35	235
Liberia	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Portugal	62	36	697	168	...	...	8	3	11	2	...	...	1	1	...	2	1	15	14	19	17	...	4	13	3	8	17	12	1	3	3	2	...	1	12	61	1197
Madagascar	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	—	12
Portuguese Colonies	18	18	26	26	...	...	...	...	1	...	...	...	...	...	...	...	...	6	...	...	...	...	2	...	4	1	...	...	...	...	...	...	...	...	...	14	116
Peru	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7
Rome	6	24	1	6	...	...	1	2	2	1	2	...	1	5	...	...	...	...	...	4	...	...	...	2	...	...	...	3	...	4	...	1	2	...	1	12	82
Russia	33	25	164	104	1	12	2	2	6	11	17	6	5	9	1	2	3	15	11	32	33	6	11	15	23	30	54	10	10	11	22	15	11	4	4	4	718
Siam	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5
Spain	156	20	596	77	3	...	1	6	2	2	8	1	...	...	1	2	7	12	41	32	40	...	...	8	1	13	28	14	...	11	7	4	2	16	22	...	1133
Sweden	84	32	72	37	5	4	6	9	22	18	10	3	12	3	5	3	2	17	11	3	21	...	2	5	10	6	17	16	12	16	25	9	8	3	3	...	511
Switzerland	6	10	58	10	...	...	9	8	3	6	10	1	9	3	72	9	3	19	1	49	5	1	5	12	3	6	15	4	5	5	8	2	11	...	4	2	374
Turkey	37	...	80	95	...	...	1	1	3	...	16	...	...	...	...	2	...	52	18	57	83	48	...	30	22	58	53	7	...	32	17	14	17	...	22	23	788
United States	5	4	6	1	3	2	8	28	13	2	1	1	1	...	...	4	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	83
Uruguay	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	35
Venezuela	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	104
Total number of Exhibitors under each Class ...	1628	990	3954	1763	173	176	455	526	365	432	378	242	368	357	301	340	259	434	425	673	1123	190	186	393	237	540	911	720	533	772	990	335	365	223	274	342	24810

In this Table, Governments, Committees, and Collective Exhibitions are counted as single Exhibitors, as there are no means of knowing in all cases how many Exhibitors are joined together in them.

India alone has 15 Exhibitors under Classes 37, 38, 39, and 40, not included in the above, comprising models of Hindoo temples, examples of native paintings, bronze and silver figures and engravings.

The British Colonies included the following number of Exhibitors, viz:—Australia, South, 77; Western, 68; Bahamas, 5; Barbadoes, 35; Bermuda, 1; Canada, 196; Cape of Good Hope, 2; Ceylon, 41 Channel Islands, 7; Domenica, 1; Honduras, 1; Jamaica, 216; Malta. 25; Mauritius, 25; Natal 5; New Brunswick, 36; Newfoundland, 22; New South Wales, 469; New Zealand, 114; Nova Scotia, 65; Prince Edward Island, 1; Queensland, 93; St. Helena, 1; St. Vincent, 4; Tasmania, 148; Vancouver, 6; Trinidad, 1; Victoria, 542. The French colonies comprise French Guiana, 14; St. Pierre and Meguelen, 2; New Caledonia, 9; Tahiti, 2; Marzotti and Nossibe, 2; St. Mary of Madagascar, 1; East Indies, 6; West Coast of Africa, 4; Guadaloupe, 6; Isle of Reunion, 4; Martinique, 5; Algeria, 106.

loftiness of aim which had characterised the lecture. Among all the merits of the lecture he admired the most, more than even the perfect mastery of his subject which the professor had shown, the high tone and character by which it was pervaded, which gave to the theme an upward aspect and taught us how commerce appertained to and served the high, moral, and social purposes of the Almighty. He knew but one deduction that could be made from the merits of the lecturer, and it was this, that he owed his birth to a country of which distinguished citizens had both, when the science of political economy was as yet in its infancy and at later periods, taken the very first rank among those who studied and who taught it. The accomplished professor had begun with giving us a history of the development and application of the idea which formed the germ of International Exhibitions, and showed in how great a degree it was a private society in England, the Society of Arts, which had nursed and cherished that idea in its infancy and had finally brought it to those ripe and splendid manifestations which took rank among the inhabitants of the civilized world. Many most important suggestions had been made upon points which were well deserving of serious consideration in connection with any future exhibition. Topics had been introduced and clearly illustrated which were not only of the deepest interest to a country like England, and at all times, but, if he might be pardoned for a seeming paradox, especially at the present time, when many facts seemed to show that the commerce of the would was as yet in its infancy, and though England in many respects had an old commercial history, there was yet a new and great career before her. It was instructive to see how the metals in which this country abounded were displacing other materials in constructions of various kinds. We were in that respect in a transition state, the extent and direction of which could be but imperfectly comprehended; but enough was known to indicate immense and important changes—changes which must, from our command of the raw material, maintain England in the future relatively on the high bases she had hitherto occupied in the industry and the commerce of the world.

The PROFESSOR briefly acknowledged the compliment.

THAMES EMBANKMENT.

SURREY SIDE.

The following is a further report made by Mr. Bazalgette, the chief engineer of the Metropolitan Board of Works, and refers to the portion of the proposed embankment extending on the South side from London-bridge to near Vauxhall-bridge:—

Nov. 6, 1862.

Gentlemen,—In my preliminary report upon the Thames Embankment of the 15th ult., I suggested for your consideration the principle upon which an embankment might be advantageously constructed on the South side of the river between London and Westminster-bridges, and the outlay thereof defrayed at a moderate cost to the public. I now submit, pursuant to your instructions, a plan showing the line of such embankment as I recommend. It would form a continuation of the line of the new embankment in front of Mr. Alderman Humphery's wharf at London-bridge, commencing on the west side of St. Mary Overy's Dock, and continued in a curved line to the South abutment of Southwark-bridge, and thence to the South abutment of Blackfriars-bridge. Up to this point the embankment would not encroach upon the river further than is required to convert the present irregular line of frontage into a regular line, and to reface the present wharves.

It is moreover proposed to cut off a small portion of the wharf wall which now projects into the river beyond the abutment of Southwark-bridge, and therefore the narrowest gorge of the stream, and so far to widen the river at this pinching point. From Blackfriars-bridge the line of the

proposed embankment gradually extends into the river as the river widens, until it reaches the first pier of Waterloo-bridge and the new Charing-cross Railway-bridge, from whence it passes, in a line nearly parallel with the present foreshore of the river, to the South embankment of Westminster-bridge.

The present docks would all be thus maintained and lengthened, and about thirteen acres of land would be added to the wharves. The river is at the same time so wide opposite the localities where the embankment extends into it that there is, if desirable, abundance of room for the storage of timber upon the foreshore, as at present, and the value of the land reclaimed ought to refund a considerable portion of the cost of reclaiming. In my preliminary report I estimated the cost of this work at £250,000, but as it will be prudent to provide for deeper foundations than I at that time anticipated, and allowing for contingencies, I now estimate it at £350,000.

The embankment recommended by the Royal Commissioners between Westminster and Chelsea bridges is estimated to cost £1,100,000, inclusive of compensations. Probably the most useful part of this scheme consists in the formation of a roadway from Westminster-bridge and the Palace New-road to a point near Vauxhall-station, whence six or seven important lines of thoroughfare diverge in different directions.

To accomplish this object, I propose to construct a roadway similar to that recommended by the Royal Commissioners up to Lambeth-bridge, but not extending quite so far into the river, and to form a junction with that bridge at its southern abutment. This line would form a better approach to the bridge, and would not interfere with its construction, as the line recommended by the Royal Commissioners must necessarily do. I propose to terminate the embankment a little above the bridge, and to cut off the projecting piece of land, and thus widen the river at its narrowest gorge opposite Millbank Penitentiary. Thence I propose to continue the roadway in nearly a straight line to the point near to Vauxhall-station, at which the roads above referred to converge. The embankment and roadway above this point are of less importance, and might for the present, with less public inconvenience, be postponed. Those premises above Vauxhall-bridge which are now subjected to flooding at high tides can be secured against this by raising their wharf wall three or four feet higher, at a very small cost to the owners thereof. The estimated cost of the works above Westminster-bridge herein recommended is £250,000, which, added to the cost of the embankment from London-bridge to Westminster-bridge (viz., £350,000.), makes a total of £600,000 for works, and leaves a margin of £500,000 upon the estimate of the Royal Commissioners (viz., £1,100,000) to cover compensations—an amount which, without having gone into the matter in detail, I believe will be found to be ample for the purpose.

I have the honour to be, Gentlemen,
Your most obedient servant,
J. W. BAZALGETTE, Engineer.

To the Metropolitan Board of Works.

It was ordered that this report should be printed, and the engineer was directed to prepare plans showing the present state of the banks of the river and what they would be if his plan were carried out.

Home Correspondence.

THE PROPOSED EXHIBITIONS OF SPAIN AND TURKEY, IN 1863.

Sir.—Exhibitions, National and International, are now an "Institution," and their value in promoting both material and social progress very generally recognised. The direct pecuniary results of the latter hitherto realised in England and France cannot fairly be taken as a test of their importance, as these depend on contingencies which do not affect the object for which such Exhibitions were established. The whole system is of course as yet in its infancy, for three trials only, one in France and two in England, do not afford sufficient reliable evidence on this secondary point, but the experience thus far gained supplies most valuable material for better organisation hereafter.

My present object, however, is not to discuss this question, but to inquire whether similar Exhibitions might not reasonably be introduced into other countries less favourably situated than France and England. To some extent the one held at Florence last year illustrates what I mean. It was modestly called a *National* Exhibition, but there were many articles admitted of foreign origin, which assisted to give interest to a display the more creditable that it was improvised in a country in which native talent and enterprise were, until lately, repressed rather than encouraged.

A similar *National* Exhibition for Spain is for the first time announced, to be held at Madrid in 1863, at the expense and risk of the Government of that country. As in Italy, however, there are reasons why a distinctly *International* character cannot, perhaps, be given to this Exhibition. The funds for purposes of national improvement at the disposal of the Government are very limited, and the physical impediments to easy communication with the rest of Europe still formidable, although a network of railways is already in rapid process of development. There are also fiscal difficulties to be removed or diminished, before native producers can be stimulated to depend solely on their own resources, and to witness without alarm the introduction of foreign products even by way of sample.

But why should this be? Of all European countries, Spain is the richest in the sources of natural wealth. Of this, its history from the earliest times affords abundant evidence, but, after the discovery of South America, its native mines were abandoned for the more easily acquired riches of the New World.

To what extent the mines of the old country are now worked, I must confess my ignorance, but we all know that many valuable mineral samples were to be found in the Spanish Department of our recent Exhibition. Indeed, the extent and variety of articles deposited there under classes 1, 3, 4, 19, 20, 21, and 25, as compared with those exhibited in 1851 and 1855, afford the most decided evidence that, but for the difficulties before alluded to, Spain ought to take a more prominent commercial position than it does in the rank of European nations.

Now, it is because I think this, that I wish to suggest to the promoters of the ensuing Spanish Exposition that they would be taking a step in the right direction were they at once to announce that, though it is ostensibly intended to be *national*, yet they would cheerfully receive and give space and prominence to the contributions of foreign producers, provided the expenses were borne by such exhibitors, for the government of that country cannot afford to incur so formidable a pecuniary responsibility as the liberal measure I have ventured to indicate would involve. I have reason to believe that the increased intelligence of the mercantile and other interests of Spain, would rather hail as a new source of experience and enterprise, than repel as a dangerous innovation, such an opportunity of comparing, *on their own soil*, the joint products of other countries and their own.

Assuming the adoption of this suggestion, there is one facility which the Spanish Government could, and no doubt would, afford to foreign exhibitors, and that is, freedom from Custom-house annoyances, for which purpose similar regulations to those which were introduced by the authorities of that department in England and France on occasion of the International Exhibitions, and which have worked so well, might be established.

But it will no doubt be asked on what ground has Spain a right to expect that an invitation, such as that for which I plead, will be responded to? I answer, that

self-interest will probably be the main inducement on the part of foreigners to send articles for exhibition. Although it is known that many who have already tried the experiment have sustained heavy pecuniary losses, it is also true that others have been large gainers by it. To many exhibitors it was no experiment, as they were prepared, on patriotic principles, to submit to a personal sacrifice. While some had reason to feel disappointment, the sales actually effected by others in the extensive orders taken from the samples therein shown have been so considerable as not only to *recoup* them the original outlay, but to encourage them to seize every opportunity that may hereafter be offered of attempting similar speculations.

From causes already suggested, many foreign goods have never been seen in Spain, and it is not, therefore, an improbable supposition that a new market for the mutually profitable exchange of foreign for native products, on a larger scale than has hitherto been obtained, will be opened up. It may then and in due time, as in 1855 in France, induce Spanish consumers to inquire whether the time has not arrived when they may hope to enjoy similar advantages to those which the recent commercial treaties of France, England, and Belgium, have conferred.

It is scarcely necessary for me to add that the foregoing considerations are almost equally applicable to the *National* Turkish Exhibition, just announced to be held at Constantinople during the spring of next year.

Altogether, then, I do hope that the suggestion I have now made will be seriously entertained and adopted, in which case I have no doubt that commissions will be at once appointed, here and elsewhere, to initiate and facilitate the measures necessary to give it full effect.

I am, &c.,
THOS. WINKWORTH.

Gresham Club, Nov. 17th, 1862.

PRESERVATION OF TIMBER.

Sir,—In the *Journal* of your Society of the 31st ult., you gave an abstract from the translation of Mons. de Lapparent's essay on the "Preservation of Timber for Shipbuilding and other purposes," by a new process of carbonisation by gas.

Allow me to state, for the information of those interested in this important subject, that the arrangement for working this patent in Great Britain has been entrusted to Messrs. York and Co. (constructors of the "Palais de l'Industrie," of 1855, in Paris), whom I represent in this country, and who will be happy to afford any information, or shew the system in operation to those who will call at this address.

I am, &c.,
JAMES WILSON.

2, Royal Exchange Buildings, London, Nov. 10th, 1862.

UNION OF INSTITUTIONS.

Sir,—At the meeting recently held upon the occasion of the distribution of the certificates and prizes gained by members of the London Mechanics' Institution, at the Society of Arts' last Examination, Mr. Chester said, in the course of his speech, that it was under consideration how best a Union might be made of the Institutions of the same kind in London. Believing this to be a very desirable object, I venture to send you a few suggestions.

The Union, I think, should be of all the Institutions of this kind in the kingdom, and every member of any one Institution should be, except as to their internal government, a member of all others. In admitting Institutions into the Union, their designation, and the amount of the subscription their members pay, should not be considered; the sole requirement should be that they are engaged in the work of educating those who do not go to any of the Universities.

There are four departments in most of these Institutions; the classes, the books, the lectures, and the news-room.

Most persons will be content with the classes in their own Institution, but they should be permitted to attend those of any other Institution of the Union at the rate (usually I believe a reduced one) charged to the members of that Institution, to which, however, they must also pay as much (if anything) as its subscription exceeds that of their own Institution. If I belong to Institution A, for which privilege I pay 4s. per quarter, and wish to join the Latin class in Institution B, the subscription to which (Institution) is 6s. a quarter, and to its Latin class (under the present arrangement) nothing if the student is, but 5s. if he is not, a member of that Institution, I should be allowed to do so on paying 2s. a quarter to Institution B, and nothing to the class.

Much more advantage can be gained in the second department—that of the books. A reader who chooses his books from one of the small libraries which are now scattered over London, must be diffuse in his reading. If all the libraries are open to him, he will find plenty of books on every subject, and, naturally taking from each what it has on his favourite branch of knowledge, he will become a student. If committees are formed to superintend the purchase of books by the different Institutions in districts of moderate extent, a continual supply of the best new books may be obtained. There will be no great difficulty in arranging the details of this plan when the proper time arrives.

As to lectures, whenever any Institution has a lecture-hall larger than necessary for its own members, members of other Institutions should be admitted free to the superfluous portion.

The community of news-rooms would be advantageous chiefly to travellers. Some arrangement would perhaps be necessary, as in the case of classes, for extra payments.

While all the Institutions in the kingdom are thus united (and I think they might well place themselves under the presidency of the Society of Arts), the Institutions in districts of convenient size might be united more closely for purposes of mutual advice and assistance. For each district there should be a Council, composed of two or three representatives from each Institution. As it would be best not to entrust any power to this Council, and as wisdom is not always the product of simple addition, the same number of representatives should be sent from each Institution, irrespective of the number of its members.

As to the holders of the Society's certificates, an immense stimulus would be given to education throughout the country by what would be an act of justice—the conferring upon the certificate holders the right of electing a member of the House of Commons, or the right of voting at the election of the member for the place in which they reside. This, however, is out of the question while the present state of public feeling continues.

I am, &c., WALTER SLATER.

London Mechanics' Institution,
November 7, 1862.

To Correspondents.

Erratum.—In the List of Members recently issued, for "Carey, Stephen, Carpenden-house, Snow's-fields, S.E.," read "Carey, Stephen, Camperdown-house, Snow's fields, S.E."

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Medical, 8½. Lettsomian Lecture. Dr. James Bird, "Private Hygiene: The Means of Preserving Individual Health. Public Hygiene: Collective Differences in the Organic Type of Masses, Mortality and Duration of Life, &c."
R. Geographical, 8½. "Latest Exploration in Africa, by Dr. Livingstone and his Brother, Mr. Charles Livingstone, Captains Speke and Grant; Consul Petherick; Captain Baker; R. Moffatt; Capt. Burton, &c."
Tues. ...Zoological, 9.
Civil Engineers, 8. Mr. Wm. Cudworth, "The Hownes Gill Viaduct, on the Stockton and Darlington Railway."
Wed. ...Society of Arts, 8. Dr. B. H. Paul, "On the Utilisation of Peat, with reference more particularly to the Manufacture of Hydro-Carbon Oils."
Thurs...Royal, 8½.
Antiquaries, 8½.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, November* 14*th*, 1862.]

Dated 7*th July*, 1862.

1958. J. McGeary, Bayham-terrace—Imp. in the manufacture of gas, and the apparatus to be employed for that purpose. (Partly a com.)

Dated 23*rd August*, 1862.

2355. F. T. Moison, 13, Rue Gaillon, Paris—Imp. in the process of cleaning organic matter.

Dated 30*th August*, 1862.

2409. W. E. Gedge, 11, Wellington-street, Strand—Imp. in machinery or apparatus for manufacturing velvet. (A com.)

Dated 26*th September*, 1862.

2629. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the construction of leaden window sashes, casements, or glazed coverings or partitions. (A com.)

Dated 9*th October*, 1862.

2725. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in polishing precious and other stones, and in the machinery or apparatus employed therein. (A com.)

Dated 13*th October*, 1862.

2757. W. G. Haig, Canonbury-park North—A new article of apparel to be worn instead of or in addition to a shirt front and waist coat.

Dated 14*th October*, 1862.

2766. J. Snider, jun., 51, Dorset-street—Imp. in the construction of "Hansome cabs," and other similar vehicles.

Dated 27*th October*, 1862.

2888. W. J. Williams, 51, Dorset-street, Canonbury-square—Imp. in the construction of field rakes for agricultural purposes. (Partly a com.)

Dated 28*th October*, 1862.

2902. G. H. Smith, North Perrott, Somersetshire—Imp. in the manufacture of crinoline or elastic hoops for dresses.

Dated 29*th October*, 1862.

2910. A. Krupp, Essen, Prussia—Certain imp. in breech-loading ordnance and fire arms.

Dated 30*th October*, 1862.

2928. G. Mayall, jun., Liverpool, and J. Hollingworth, Micklehurst, Cheshire—Certain imp. in machinery or apparatus for preparing cotton and other fibrous materials for spinning.
2930. G. Piggott, Birmingham—New or improved machinery for punching, shearing, and rivetting sheets or plates of iron and other metals and alloys.
2932. J. Horton, Smethwick, near Birmingham—Imp. in the construction of armour plated ships and fortifications.
2934. A. Guild, Horbury-gardens, Notting-hill—Improved apparatus for preparing and treating leaves and stalks of fibre-yielding plants and for cleaning and dressing the same.

Dated 31*st October*, 1862.

2936. W. Astrop, Jubilee-street, Stepney—Imp. in the manufacture of paper.
2940. D. Spink, Spaxton, near Bridgewater, Somersetshire—Imp. in the method of propelling ships and other vessels.
2942. C. Gubbins, York-place, Portman-square—Imp. in irons for ironing.
2944. H. Thomson, Buckden, Huntingdonshire—Imp. in railway signals.
2946. G. Speight, 5, St. John-street-road, Clerkenwell—An imp. in the manufacture of collars for men's wear.
2952. W. Jenkins, Troedy Rhiw, Merthyr Tydvil, Glamorganshire—An improved mode of and apparatus for cutting coal.

Dated 1*st November*, 1862.

2958. E. Stevens, 15, Hunter-street, Brunswick-square—Imp. in iron shelves, stands, and racks.
2960. E. Hopkins, Clarendon-gardens, Maida-hill—An improved mode of and apparatus for treating ores for the extraction of metals therefrom.

Dated 3*rd November*, 1862.

2964. C. Shield, Newcastle-on-Tyne—Imp. in the manufacture of malleable cast iron.
2968. E. Humphrys, Deptford—Imp. in the construction of centrifugal pumps.
2970. T. O. Clark, Clapham-common—An improved portable spring bottom bedstead. (A com.)
2974. W. H. Stallard, Mark-lane—Imp. in umbrellas and parasols.

Dated 4*th November*, 1862.

2978. J. McKean, Walmer Bridge Mills, near Preston, and T. Greenall, Manchester—Imp. in sizing or dressing yarns or textile materials.
2980. T. Logan, Kensington—An improved kaleidoscope.
2986. J. E. F. Ludeke, Marke, Hanover—Imp. in magneto-electric apparatus for obtaining and applying motive power.
2988. A. Wall, Canton-street East, India-road, Poplar—Improved process for purifying lead, and extracting and separating silver therefrom, and in machinery for those purposes.

Dated 5*th November*, 1862.

2990. S. Robotham, Birmingham—Imp. in carriage bodies.
2992. W. Johnson, 166, Buchanan-street, Glasgow—Imp. in the arrangement and construction of pillars or standards for supporting telegraph wires. (A com.)
2994. R. A. Brooman, 166, Fleet-street—Imp. in taps or cocks. (A com.)
2996. C. Shield, Newcastle-upon-Tyne—Imp. in the manufacture of malleable cast-iron.
2998. J. Petrie, jun., Rochdale, and J. Teal, Sowerby, Yorkshire—Imp. in machinery or apparatus for washing wool and other fibrous materials.
3000. D. Hill, 8, Camden-road, Holloway—Imp. in apparatus for stamping or marking and counting bank notes and other documents.
3002. T. Brown, 85, Wood-street, Cheapside—Imp. in machinery for surfacing fibrous materials. (A com.)

Dated 6*th November*, 1862.

3004. W. E. Gedge, 11, Wellington-street, Strand—An improved lift and force pump. (A com.)
3006. H. Griffin, Silvertown, Essex—An improved method of securing india-rubber cylinders or rollers and blocks upon spindles and other bodies on which they are to be mounted.
3008. J. A. Fullarton, Manchester—Imp. in machinery or apparatus for painting and coating hoop iron and other strips, bars, rods, or other such articles of metal, wood, or other material.

PATENTS SEALED.

[*From Gazette, November* 14*th*, 1862.]

November 14*th.*

1415. H. Walker.
1498. R. Davison and T. Johnson.
1508. J. Wright.
1515. T. Morris, R. Weare, and E. H. C. Monckton.
1516. T. Morris, R. Weare, and E. H. C. Monckton.
1521. W. Naylor.
1523. J. Taylor.
1525. E. Fewtrell.
1528. W. Petrie.
1540. C. W. Siemens.
1545. S. Turnbull & F. Turnbull.
1557. W. E. Wiley.
1573. W. Worby.
1609. J. A. Ransome.
1691. E. Conroy.
1701. E. Conroy.
1702. G. Hadfield.
1810. M. Wigzell.
2426. W. Hunt.

[*From Gazette, November* 18*th*, 1862.]

November 18*th.*

1533. M. A. Le Brun Virloy.
1534. W. Bush.
1542. E. de la Bastida.
1544. J. Needham.
1550. H. Cook.
1558. J. Webster.
1560. E. Mouline.
1562. A. Samuelson.
1576. G. A. Huddart.
1588. F. Tolhausen.
1608. W. Blackmore & H. Lumb.
1636. J. Ives.
1934. J. Webster.
1940. W. M. Williams.
2445. B. F. Cowan.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, November* 18*th*, 1862.]

November 11*th.*

2570. A. Vickers.
2595. J. Graham.
2615. S. Corbett.
2623. A. Godchaux.
2635. G. W. Lennox.

November 12*th.*

2578. J. Walworth and R. Harrowby.

November 14*th.*

2585. W. H. Ward.
2586. E. Borlase.
2603. J. Ward and H. Burman.
2619. E. Barlow and F. Hamilton.

November 15*th.*

2610. J. McKenzie and S. T. Wentworth.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, November* 18*th*, 1862.]

November 11*th.*

2581. G. T. Bousfield.
2768. H. Bessemer.

November 12*th.*

2597. G. Collier & J. W. Crossley.
2602. W. Smith.

November 14*th.*

2612. A. V. Newton.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No.	Date of Registration.	Title.	Name.	Address.
4522	Nov. 6	A Needle Case	Arthur James...	Redditch.
4523	,, 11	A Fastener for Boas, Victorines, Scarfs, Ties, and other articles	Geo. Philippe Lempriere ...	Birmingham.
4524	,, 14	Needle-plate for Sewing Machines	William Newton Wilson ...	144, High Holborn, W.C.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 28, 1862.

NOTICE TO MEMBERS.

General Index.

A general Index to the first ten volumes of the *Journal* will shortly be published, which should be bound with the present volume. Members who desire to have copies are requested to apply to the Secretary as early as possible, in order that a sufficient number may be printed.

EXAMINATIONS, 1863. — NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The attention of Secretaries of Institutions and Local Educational Boards is specially called to the following extract from the programme of examinations for 1863 :—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1863. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Whenever this is the case, the names and addresses of the members, both of District Board and of its Branch Boards must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

SOCIETY'S PRIZE WRITING CASE.

It will be in the recollection of members that in the Session of 1858-9, a Prize was awarded to Messrs. Parkins and Gotto for a writing case to be sold to the public at 1s. 6d. or 2s. fitted, and of which a very large number have been disposed of.

The Council have pleasure in announcing that this has led to the production of other writing cases of a somewhat similar character, and Messrs. Partridge and Cozens, of Fleet-street, have brought one under their notice which appears to be conveniently and usefully arranged, and which is sold, fitted, at 1s. 6d.

SECOND ORDINARY MEETING.

Wednesday, November 26, 1862.

The Second Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 26th inst., Dr. A. W. Williamson, F.R.S., Professor of Chemistry, University College, London, in the chair.

The following candidates were proposed for election as members of the Society :—

Avery, Joseph	81, Great Portland-street, W.
Bowman, George	(J. Bowman and Son), Langholm.
Brown, Alfred	115, Whitechapel, E.
Canton, Edwin, F.R.C.S.	30, Montague-place, Russell-square, W.C.
Crichley, Henry	Bromfield House, Birmingham.
Duppa, Duppa	Longville, Wistanstow, Shropshire.
Edwards, Charles Stuart	64, Friday-street, E.C.
Fenton, Hugh	Queen's Ferry Wire Rope Works, near Flint, North Wales.
Geary, John	Prince of Wales-road, Kentish-town, N.W.
Goss, W. H.	Stoke-on-Trent.
Gregory, Henry	Herne-hill, Dulwich, S.
Hamilton, Edward	500, Oxford-street, W.C.
Hobbs, Thomas	15, Earl's-court-gardens, Old Brompton, S.W.
Hutton, John	10, Mark-lane, E.C.
Klaber, Herrman	Albion-pl., London-wall, E.C.
Knewstub, Fabian	33, St. James's-street, S.W.
Launspack, Louis	9, Upper Berkeley-st. West, Hyde-park, W.
Mathews, George	Upper Russell-street, Bermondsey, S.E.
McDougall, Archibald	11, Upper Thames-street, E.C.
McLachlan, James	35, St. James's-street, S.W.
Mitford, Bertram	Cheltenham.
Moore, Charles	Rose Hill, Swansea.
Morant, Robert	91, New Bond-street, W.
Norris, J.	36, Little Russell-street, W.C.
Pilcher, W. F.	Morgan's-lane, Tooley-st. E.C.
Quarm, Thomas	Rose-villa, St. John's-road, Brixton, S.
Radclyffe, Leopold Henry	30, Hanway-street, Oxford-street, W.
Rivière, Robert	196, Piccadilly, W.
Scott, Henry D.	Market-place, Boston, Lincolnshire
Scott, Robson J.	8, Whitefriars-street, E.C.
Shaw, James	2, Royal Exchange-ct., Glasgow, and 150, Leadenhall-street, E.C.
Smith, Charles	43, Upper Baker-street, N.W.
Smithers, H. W.	6, Coborn-terrace, Rye-lane, Peckham, S.E.
Stephenson, James	Patent Wire Rope Works, Millwall, E.
Thompson, Henry	Albert-cottage, Weybridge-heath, Surrey.
Watkins, Herbert	215, Regent-street, W.
Willans, Jacob Geoghegan	Belfast, Ireland, and 9, Phillimore-terrace, Kensington, W.
Willoughby, d'Eresby, Lord	142, Piccadilly, W.
Wood, Wm. Robert	Carlisle-house, Brighton.

The following Institution has been received into Union since the last announcement :—

Metropolitan Association for promoting the Education of Adults.

Previously to the reading of the Paper the Secretary called attention to some specimens of a substance proposed as a substitute for cotton. A description will be found at page 48.

The Paper read was—

ON THE UTILIZATION OF PEAT, WITH REFERENCE MORE PARTICULARLY TO THE MANUFACTURE OF HYDRO-CARBON OILS.

By B. H. Paul, Ph.D.

The application of peat to some useful purpose, is a subject which has at various times attracted considerable attention ; a vast amount of inventive ingenuity has been bestowed upon it ; it has given rise to very sanguine, and I may say, in some cases, very exaggerated expectations, and as a natural consequence it has been a source of proportionate disappointment. Notwithstanding the numerous attempts and proposals that have been made for utilizing peat, very little has been done as to inquiring into and elucidating what are really its capabilities and disabilities as a material for use in the arts. But a knowledge of these circumstances is an essential preliminary to any successful application of it, and I hope to be able, in some degree, to contribute to the acquisition of such a knowledge by bringing before this Society the results of several years' practical experience in the prosecution of this subject.

Taking it for granted that the existence of enormous deposits of peat in various parts of the kingdom is sufficiently well known, and having regard more especially to its technical value, it will be unnecessary for me to enter into any consideration of the origin and formation of peat, or of the different views entertained on that subject. It will be sufficient for my purpose to consider peat as it exists now ; and with regard to this point there are two modes in which it occurs, which I believe to be of importance as regards its application to useful purposes. In one case we find peat deposits in the form of what are called peat-bogs, masses of peat of considerable superficial extent, and generally of great depth, 20, 30, and sometimes upwards of 100 feet deep, where the uppermost layers are of a loose, fibrous, or grassy texture, and saturated with water to such an extent, in some instances, as to be incapable of affording any support to the foot. When the water is drawn off from these bogs by drainage, the peat is generally found to vary in character according to the depth at which it is situated, gradually becoming darker in colour, more compact, and having less evident indications of vegetable structure. At the bottom of such bogs the peat is generally a black pasty mass, of a clayey consistency.

In the other case, we find, situated on the slopes of mountainous country, peat deposits, which are never of very great depth, generally from 12 to 2 feet, and where the peat is sufficiently solid to be walked upon with ease. In these deposits the peat is of a more uniform texture and character throughout, than in bogs, although there is always a greater or less difference between the peat at the surface and that at the bottom. These deposits of mountain peat are very common in the Highlands of Scotland and in some parts of Ireland.

Mountain peat offers very much greater facilities for cutting than bog peat, and it is generally of much better quality. Bog peat, when dried, has very much the appearance of pressed hay ; it rarely has a density of more than 300 or 400—water being 1,000,—and the cubic foot weighs only from 15 to 30 pounds ; it would perhaps be useful to distinguish it by the term turf, from the true mountain peat, which when dried is dark brown or quite black, with little or no remains of plants in it ; capable of taking a high polish when rubbed, and of a density greater than that of water, the cubic foot weighing from 53 to 78 pounds.

The method of cutting peat in the Highlands of Scotland is very different from that adopted for cutting peat from bogs. In the first place trenches are opened at distances of about ten yards apart ; and, according to the nature of the ground, these trenches are made from 50 to 400 or 500 yards long. After removing the surface sod at the places where the trenches are to be cut, for a width of three feet, along the whole line of the trench, the peat cutter digs out the peat with a peculiar-shaped tool, in slices of about a foot square and three or four inches thick. As fast as these slices are cut, another man takes them off the peat iron and throws them on the surface, so as to spread them out as much as possible. In this way prisms of peat, measuring three feet in width and depth are cut out at intervals of ten yards, and the number of slices cut in each trench are just as many as a man can throw on both sides of the trench without shifting his position except from one end of the trench to the other as the cutting advances.

In succeeding years the peat is cut from the two banks thus formed in each trench, to a width of only 18 inches and a depth of three feet. The advantage of this system of cutting is that there is no necessity for removing the peat by barrows to the spreading-ground, a proceeding which is attended with considerable expense for labour. When the peat is cut in this way from a bank 150 yards long, it will give 75 cubic yards of wet peat, and the number of slices into which this is divided will be about 8,000. Then, as the banks are ten yards apart, there are five yards width of drying ground to each bank, or a superficial area of 6,750 square feet to each bank of 150 yards long. Cutting it in this way every year, it would take ten years to remove the whole of the peat to a depth of three feet. As the banks are cut away in successive years the area of spreading-ground on the surface is reduced, and some of the peat has to be spread at the bottom of the trench, the area of which increases as that of the banks' surface is reduced by the cutting.

The peat cut to a width of 18 inches and a depth of three feet, from a bank of 150 yards long, is what is called an iron's work, and the 75 yards of peat so cut yields about ten tons of dry peat, so that to cut seven or eight thousand tons of dry peat would require 750 irons' work, or banks about 64 miles in length, and extending over an area of about one-fifth of a square mile. This area of ground would supply seven or eight thousand tons every year for ten years.

The cutting and spreading of peat in this way forms but a proportion of the cost of the dry peat. A far more considerable portion of its cost results from the labour of collecting the dry peat and bringing it to the place where it is to be used. Herein lies one of the greatest difficulties of employing peat on any very extensive scale. Whatever mode may be adopted for collecting the dried peat to one spot for use, the cost of carriage will increase in proportion to the increase in the quantity of peat consumed at that spot. Thus, for instance, in the case of a factory consuming 7,000 tons annually, it would be requisite to carry the peat, on the average, a distance of one-tenth of a mile ; if the quantity consumed were 70,000 tons, it would be requisite to carry it an average distance of half a mile, and if the quantity consumed were 300,000 tons a year, it would have to be carried an average distance of two miles, or a mile and a half, inasmuch as the cutting-ground would extend over an area of eight square miles.

The extent to which this disadvantage affects any particular instance of the use of peat will depend very much on the skill exercised in laying out the ground for cutting the peat and in disposing the banks and tram-roads, or other means for conveying the peat to the place where it is to be used ; but it is a disadvantage which can only be reduced by such means within the smallest possible limits, and which is quite inseparable from the use of peat on a large scale.

Another prominent difficulty attending the use of peat consists in obtaining it in a dry state, fit for use as fuel or otherwise. Mountain peat, as it occurs naturally, contains as much as 80 per cent. of water, even when it has been well drained, and bog peat often contains very much more. Consequently, to obtain one ton of dry peat, five tons of material have to be dug and spread, and four tons of water have to be got rid of by evaporation. When mountain peat is cut in slices, as I have described, and spread

out on the ground during dry weather, the drying goes on rapidly, the surface of the pieces acquire a kind of skin, which is not wetted again by rain, and the peat, in the course of a week, is sufficiently hardened to be handled;—the pieces are then set up on edge, so that the air may play on both sides, and, in the course of six weeks or two months, they are dry enough to be stacked or heaped up. But, unfortunately, peat districts are generally remarkable for a very moist atmosphere and for a great frequency of rain. In the Highlands of Scotland and in the Hebrides, on the average there is rain four days out of six, and it is only during the months of May, June, and July that you can expect to have any continuance of weather favourable for drying peat. It is necessary, therefore, to obtain the utmost advantage of that period for the drying of the peat, and to do so the peat must all be cut before the end of May at latest. On the other hand, if the peat is cut during frosty weather, and becomes frozen, it crumbles to powder when the thaw comes, and for this reason it is not safe to commence the cutting at all before April or even May. As a rule it might be said that the month of May is the only time available for cutting peat in the Highlands of Scotland, and more especially in the Hebrides, so as, on the one hand, to avoid the destruction of the peat by frost, and on the other hand, to ensure the best possible chance of getting it well dried.

Notwithstanding the general moist condition of the air in those places, the boisterous winds which prevail are very efficacious in drying the peat; and if, during the months of May and early part of June, the peat has got a certain amount of drying, and a skin has formed on the surface of the pieces, it may be considered safe, whatever kind of weather there may be afterwards. It may then remain on the ground, set up in little heaps, till the autumn, and will get the advantage of whatever dry weather there may be. Of course, even in this case, the quality of the peat will depend on the weather, but if the cutting is not finished by the end of May, there is always less probability of getting the peat in good condition.

It will be evident from these circumstances that the cutting of peat, to supply a factory consuming any large quantity, must be an affair requiring considerable management, so as to get the work done in the short space of time available for it, and the difficulty of effecting this increases in proportion to the quantity of peat required to be procured.

Two men working together, one cutting and the other casting the peat, will, in good weather, get through about one iron's work in a day, equivalent to ten tons of dry peat, so that if they were able to work every day during May they would cut from 200 to 300 tons of peat; and to get 10,000 tons cut and spread, 100 men would be required for the whole month; and to get 300,000 tons cut and spread would require 3,000 men to be employed for the whole month. It is unnecessary to dilate upon the difficulty of getting such a large number of men together for the work, and of organising a system for measuring the work done and carrying on the general supervision of the peat cutting on such a large scale, but I may mention that there are circumstances connected with the habits of the people in these districts, which are in some degree favourable to the carrying out of such an operation. The people are almost all fishermen, and the fishing season does not commence until the end of May or June, so that it would be possible to obtain many of these men before they go to the fishing, and thus the inconvenience of employing a large number of men for a short period would not be so great there as it would in most other instances. Moreover, these people are accustomed to hutting themselves with no small degree of comfort, in huts or bothies built of the surface sods of the peat, and they live in these as a rule, throughout the Hebrides, so that a squad of 200 or 300 men find, on the ground where they are going to work, the materials for their encampment, and it is interesting to see the dexterity and quickness with which they construct these bothies.

Having now described the mode of obtaining the peat and pointed out the two great difficulties involved in the supply of a large quantity of it for the purpose of fuel or for any other application, I will now request your attention to the nature of this material when it has been dried, and in the first instance, as regards its application as fuel.

Even in the most favourable seasons the air-dried peat retains a considerable amount of water—from 20 to 30 per cent.—as will be seen from the following results or analyses of different kinds taken from stacks a year old:—

LEWS PEAT.	AIR DRIED.	
	Per centage of water.	Weight of a cubic foot.
		lbs.
1. Light brown fibrous turf ...	40	25
2. Blackish brown fibrous peat .	26 71	53
3. Black peat very dense	25·39	54
4. Black peat very dense	31·60	65
5. Brown peat	28·74	71
6. Brownish black peat	27·76	78

This water cannot be separated from the peat except by kiln drying, but in order to illustrate the effect of this moisture on the value of peat as fuel, I will at first suppose that it has been so dried as not to contain any water. In that state the composition of peat may be taken as generally represented by the following proportions as compared with coal:—

	PEAT	COAL.				
		Welch.	New-castle.	Lanca-shire.	Scotch.	Derby-shire.
Carbon...........	60	83·78	82·12	77·90	78·53	79·68
Hydrogen ...	6	4·79	5·31	5·32	5·61	4·94
Oxygen	32	4·15	5·67	9·53	9·69	10·12
Ash	2	4·91	3·77	4·88	4·03	2·65
	100					

Combustion, or that chemical process by which heat is generated from ordinary fuel, consists in the combination of carbon and hydrogen with atmospheric oxygen.

The amount of heat produced by the combustion of any kind of fuel depends, therefore, on the amount of carbon and hydrogen it contains. The amount of heat produced by any particular fuel, or its calorific power, is expressed by comparison with the amount of heat produced by the combustion of carbon, which is taken as unity. Hydrogen gas, when burnt produces an amount of heat three times as great as that produced by the combustion of an equal weight of carbon to carbonic acid. The calorific power of hydrogen is therefore three times as great as that of carbon. The per centage composition of a fuel being known, it is easy to determine its relative calorific power, that of carbon being =1,000. When the combustible portion of the fuel consists of carbon only, as in coke or charcoal, the per centage of carbon expresses the calorific power or relative fuel value as compared with pure carbon. When the combustible portion of the fuel consists of carbon and hydrogen, the per centage amount of hydrogen multiplied by three and added to the number expressing the per centage of carbon, gives the calorific power of that fuel as compared with carbon; but when the fuel contains oxygen besides carbon and hydrogen, a portion of either or both of these constituents equivalent to the amount of oxygen contained in the fuel must be regarded as already in combustion with oxygen, and, therefore, as ineffective for the production of heat. In such cases it is only the surplus carbon and hydrogen, over

and above what are equivalent to the oxygen of the fuel, which can produce heat by combustion. Therefore, the greater the amount of oxygen in any fuel, the smaller will be the calorific power. In this respect there is a great difference between coal and peat. The presence of a large amount of oxygen in fuel affects the calorific power in two ways—viz., by reducing the percentage amount of carbon and hydrogen, and by rendering a portion of those constituents ineffective for the production of heat. For this reason the calorific power of absolutely dry peat is only 660, while that of coal is from 966 to 903.

Hence it will be evident that the maximum capability of peat as fuel is necessarily far below that of coal, even when the peat is absolutely dry. But, as I have already pointed out, that degree of dryness cannot be attained except by kiln-drying, and the ordinary air-dried peat of good quality contains one-fourth its weight of water. Here then is a further reduction of the calorific power of this substance, by one-fourth or to 495; about one half that of coal.

In some cases where peat is needed for fuel it is essential to have it quite dry, and then it is worth while to kiln-dry it; but there is no saving effected by so doing. The 25 per cent. of water separated by kiln drying requires for its separation a determinate quantity of heat and a proportionate consumption of fuel, which is equally consumed without useful effect, whether the peat be used as fuel in the air dried state or whether it be kiln dried before it is used.

These simple considerations will be sufficient to show what a palpable delusion it would be to suppose that peat could possibly be in any way equal to coal in fuel value.

The greater bulkiness of peat as compared with coal is another circumstance which operates against its application as fuel. The average of coal has a density corresponding to 80 pounds to the cubic foot, while air-dried peat has a density corresponding to only 64 pounds to the cubic foot. A cubic foot of coal, in the state in which it is used, contains about 60 pounds, whereas peat in the same way weighs only 30 pounds to the cubic foot, so that with only half the calorific power it takes twice the space, and to produce a given effect with air dried peat, it would require twice the weight and four times the bulk of the coal to produce that effect.

Hence has arisen the idea of compressing peat. It is notorious that no success has attended any of the attempts to carry this idea into practice, and that this should be the case is very easily intelligible. Absolutely dry peat of the very best quality has a fuel value of 660 as compared with coal at 960; in order, therefore that equal bulks of coal and peat should have the same fuel value, a cubic foot of peat must contain nearly one and a half times as much in weight as a cubic foot of coal, or nearly 116 pounds to the cubic foot, corresponding to a density of 1,800. Whether such a compression of peat is or is not possible in practice I will not pretend to say, though I consider it very improbable, and even if it were effected so as to be of practical utility, there would still be the disadvantage attending the use of peat as fuel, that its calorific power would be only two-thirds that of coal, and that one and a half times as much must be used to produce the same effect.

As regards the use of peat for fuel, it now remains only to consider what are the circumstances under which it can be used for this purpose, and under which there is an advantage in using it rather than coal. I can best illustrate this by a case within my own experience. During the last four years I have had occasion to manufacture a large quantity of bricks in one of the Western Islands of Scotland, and for that purpose required fuel for raising steam to drive the brick machinery and for burning the bricks. Coal could be delivered at the port of Stornoway at about 18s. per ton, and, as the works were at some distance inland, there was a cartage amounting to 4s. per ton, making the cost of the coal 22s. per ton. But I found that the peat, of which there was abundance close to the works, was capable of raising steam well, and of being used for burning the bricks, and that, taking it to have only half the fuel value of coal, and even with very imperfect arrangements for bringing it in from the moor, I could, for 8s., put down at the boiler or at the kiln, a quantity of peat equivalent to one ton of coal, thus making a difference of 14s. between the use of a ton of coal and the use of peat equivalent to it. As the burning of the bricks required about half a ton of coals per thousand, this was equivalent to a saving of 7s. per thousand in the cost of the bricks. In this case, therefore, there was an unmistakeable advantage in using peat as fuel, and the advantage would have been still greater if there had been a more efficient means of bringing in the peat from the moor. In the case to which I now refer this cost as much as the peat itself cost on the moor, or about 2s. per ton.

In the town of Stornoway, however, it is found to be more advantageous to use coal at the gas works, and as fuel for the steam-boiler at the slip, and for general purposes, since there is no organised system for supplying the peat from the moors, which are three or four miles distant from the town, the consequence being that the gathering and cartage of the peat costs as much as 4s. or 5s. per ton over and above the cost of cutting and drying, or, in all, 6s. or 7s. per ton. At that cost it is evidently better to use coal, which is so much more easily obtained, and which, being double the fuel value of peat, is not much dearer.

From my own experience of the use of peat as fuel, I consider that wherever it can be had on the spot, and, with a fuel value one half that of coal, can be put down at a cost of 4s. per ton at the place where it is to be used, it may be advantageously substituted, when coal, under the same circumstances, costs more than 10s. per ton; but if coal can be had for 10s. per ton, or less than that, there would be a disadvantage in using peat.

When the place where peat is to be used is far distant from the moor where it is cut, the cost of its carriage, under the most favourable circumstances, amounts to twice as much as the carriage of coal, because the fuel value being only half that of coal, two tons of peat are required for one ton of coal. This necessarily limits the use of peat as fuel to places near the moors where it is cut.

Besides the compression of peat, various other modes of improving it for use as fuel have been tried; the general principle of all these modes of treatment is the kneading or pugging of the peat, so as to give it a more uniform and compact texture and greater density. Peat which has been prepared in this way will have, when dried, a density sometimes equal to that of coal; but I have never been able to perceive how these operations can be advantageously applied to peat, for the following reasons:—In the first place it must be remembered that to obtain a ton of dry peat it is necessary in the kneading or pugging which is intended to improve its texture to operate upon five tons of material. Supposing that to be rendered practicable by suitable mechanical contrivances, so as not to cost more than it is worth or more than is proportionate to the consequent improvement of the peat, it must be remembered that this kneading or pugging of the peat does not separate the water—it does not dry the peat. This—which is the greatest difficulty of all in regard to the use of peat—still remains to be done, and even admitting that some of the water may be separated by the pugging there will be at least three tons of water to evaporate in order to obtain one ton of dry peat.

The idea of employing heat to evaporate that water, of drying the peat artificially, is quite out of the question, since the consumption of fuel for that purpose would be quite disproportionate to the value of the peat obtained. The only plan of drying that is practicable is air-drying, and to dry peat by exposure to the air it must be spread out over a large surface. Every ton of dry peat will require 75 square yards of drying ground, and if the quantity of peat required every year is 30,000 tons, the area of the cutting ground will be one square mile at least. Now if

the peat is to be submitted to the operation of kneading or pugging, and has then to be dried by exposure to the air, it must, if the pugging machinery is fixed, be carried to the machine and then carried back to the spreading ground. This carriage to and fro will amount to ten times as much as the carriage of the dry peat itself, and must evidently add considerably to the cost. If, on the other hand, the pugging machine be locomotive, another obstacle to the adoption of this plan of treatment arises from the necessity of carrying out the cutting and spreading of the peat within a very limited time, as I have already pointed out.

Now, when we consider all these circumstances, and compare the cost of applying this treatment to peat with the results effected by its application, I think it must be obvious to any one acquainted with the peat districts, with the use of machinery, and with the value of fuel, that the attempt to apply such treatment to peat is like breaking a fly upon a wheel, that the means are totally disproportionate to the end, and that the use of peat as fuel is altogether dependent on local circumstances, the principal of those circumstances being the want of coal or the high price of it, and the presence of an abundance of peat of good quality. These are the circumstances which would determine the consumer of fuel in choosing peat or coal. It is entirely a question of cost. To the landowner there may be in some cases other inducements to promote the use of peat in place of coal, such, for instance, as the employment of a population which would otherwise be in idleness; the desire to clear away the peat and make land available for agricultural purposes;—but these circumstances are all incidental, and of a nature foreign to the true merits of the question as to the value of peat as fuel.

I am quite convinced, however, that there are many places in the Highlands of Scotland, and perhaps also in Ireland, where the concurrent influence of a variety of circumstances favourable to the application of peat as fuel, is sufficiently great to admit of a vast amount of good being effected by carrying out the cutting of it on a large scale. Thus, for instance, steam communication between Glasgow and the various ports of the Western Islands of Scotland is still very expensive on account of the necessity of sending out the coal for the return passage of the steamers. The cost of the coal consumed in the steamers running between Glasgow and Stornoway is about £80 each passage, and there is much more than a mere probability that a judicious and liberal minded application of capital would be succcessful in establishing the use of peat as fuel in those steamers on their return passage to Glasgow. The applicability of the peat for this purpose is undoubtable. I have employed peat as the only fuel for steam boilers during the last four years, and have found it to answer admirably. It has also been tried by Mr. James Napier, of Glasgow, on board his steamer the *Lancefield*, and he is of opinion that it might be used in the place of coal. The fact of its being only half the fuel value of coal would in this instance be counterbalanced by the advantage of its cost being less than that of coal. Besides this, the steamers running between Glasgow and the Western Islands are chiefly supported by the freights from Glasgow; their return cargoes are sufficiently small to admit of their using peat as fuel, although a greater weight and bulk would be needed of it than of coal. Moreover, the peat being a natural production and incumbrance of those islands, its use for this purpose would at once be a means of establishing a productive industry and also of affording what is so much needed there,—a greater opportunity for employment—while at the same time the condition of the people would be bettered; and, by the removal of the peat, land would be cleared for cultivation, and the climate improved and rendered less unfavourable to vegetation. At present, however, the peat deposits of these islands and of the Highlands generally, though containing the elements of social amelioration, of industry, and of wealth, lie like a huge inanimate chaos, burying the land which might yield abundant harvests, preventing the labour of the inhabitants, and hindering the development and maturing of the crops on those few patches of ground which are yet cultivated.

The next application of peat, and that to which I purpose to refer more especially in this paper, is the manufacture of oils and paraffin from it by distillation.

It will doubtless be remembered that, in the year 1849, great interest was excited in Parliament and throughout the country by the announcement that a method of obtaining valuable products from the peat of the Irish bogs had been discovered, and that a company had been formed for the purpose of carrying out, on a large scale, the manufacture of those products from peat in Ireland.

The proposed undertaking was very warmly supported by the press, and was described in a popular journal as constituting an Irish El Dorado.

This mode of working peat was devised by Mr. Rees Reece. It consisted in distilling the peat in a kiln, much in the same way as Lord Dundonald, in 1781, distilled coal for tar, oil, etc., with this difference, that Mr. Reece employed a kiln constructed more in the form of an iron smelting furnace at the bottom, and that he employed, as in such iron furnaces, a blast of air for the purpose of maintaining the combustion of the peat at the lower end of the kiln, by which means heat was produced for distilling the peat at the upper part of the kiln. By thus distilling peat, a tar was obtained which, on subsequent distillation and treatment, yielded oil and paraffin.

In consequence of the very great public attention directed to this project, an investigation of the subject was instituted, at the suggestion of Lord Clarendon and the Chief Commissioner of Woods, by the chemical officers of the Museum of Irish Industry, under the direction of Sir R. Kane. The results of that inquiry were published in a Blue-book in the year 1851.

Among the products which were shown to be obtainable from peat, were paraffin and certain hydro-carbon oils, which it was proposed by Mr. Reece to use as solvents of india rubber and for lubricating machinery.

These oils and paraffin were obtained, in the first instance, as tar, by the distillation of the peat, and the results given in Sir R. Kane's report go to show that there is no serious difference in the nature and amount of the produce, whether the distillation of the peat be conducted in close retorts or in kilns, as proposed by Mr. Reece.

The experiments that were made with different kinds of peat gave the quantitive results shewn in Table I. (next page).

There is some degree of discordance in these results, but, taking the average, it will be seen that the peat distilled in close retorts yielded nearly 3 per cent. of tar, and when distilled in kilns it gave nearly 2½ per cent. In the former case the tar gave, on the average, rather more than half its weight; and, in the latter case, rather less than half its weight of refined oils and paraffin.

It must be borne in mind that all the varieties of peat referred to in Sir R. Kane's report are true "bog peat," the only result quoted by Sir R. Kane for mountain peat being that obtained by Dr. Hodges, of Belfast, in 1850, from an experiment conducted by him with about 50 tons of peat at Newtown Commelin, in Antrim.

Taking the average of these results, the 100 tons of Irish bog peat would yield by distillation in close retorts 2 tons. 15 cwt. of tar, which gave by subsequent treatment 409 gallons of refined oils and paraffin, and by kiln distillation the 100 tons would yield 2 tons 8 cwt. of tar, or 304 gallons of refined oils and paraffin.

If this tar, or the oils and paraffin it yields, be taken as the sole commercially valuable products from the distillation of the peat, and if the cost of the peat is taken as 2s. per ton, as set down by Mr. Reece, and quoted in Sir R. Kane's report, the tar would cost, for raw material alone, about £4 per ton, and the cost of raw material equivalent to one gallon of refined oils and paraffin would be 7d.

Adding to this cost of raw material the cost of making the tar and refining the oil and paraffin as amounting jointly to 1s. per gallon, the total cost of the refined product would be 1s. 7d. per gallon.

TABLE I.

Kind of Peat.	Pounds per cubic foot.	Peat distilled in retorts. Per centage of tar.	Peat distilled in retorts. Per centage of oil from tar by weight.	Peat distilled in retorts. Refined oil from 1 ton tar, gallons.	Peat distilled in kiln. Per centage of tar.	Peat distilled in kiln. Per centage of oil from tar by weight.	Peat distilled in kiln. Refined oil from 1 ton tar, gallons.	
1. Mixed light and dense turf (Phillipstown).........	33·5	2·000	58·8	155	—	—	—	Sir Robert Kane and Mr. Sullivan.
2. Light surface turf (Allen)......	21·0	3·577	46·1	121	2·510	55·3	144	
3. Dense peat (Allen).........	29·7	2·767	43·8	115	2·395	43·1	113	
4. Light fibrous turf (Ticknevin).	30·3	2·916	70·2	184	—	—	—	
5. Light fibrous turf	”	2·344	64·2	168	—	—	—	
6. Light fibrous turf (Shannon)...	17·5	4·417	38·2	100	—	—	—	
7. Dense Peat (Shannon)	53·3	1·462	70·1	184	2·270	50·0	132	
Average	—	2·787	55·9	147	2·391	48·5	128	
8. Dense mountain peat (Antrim)	—	—	—	—	4·440	—	—	Dr. Hodges.

It is not very probable that at this rate of cost the manufacture of these products from peat would be very remunerative, especially at the present market price of these oils and paraffin; but in Sir R. Kane's report, which has especial reference to Mr. Reece's project for working peat, other products besides the oil and paraffin are taken into account as adding to the profits that might be expected from this undertaking.

These products are sulphate of ammonia, acetate of lime, and wood naphtha; and so much were they regarded as a source of profit to be anticipated from the working of peat, that in the prospectus of the Irish Peat Company they were set down as furnishing more than one-half of the expected profits of the works.

The values assigned to these products in Sir R. Kane's report are not inded quite so great, as regards the amount as those stated by Mr. Reece, but they are, nevertheless, considerable, being for the 100 tons of peat as follows:—

MR. REECE.

Sulphate of ammonia, 20 cwt. at 12s.	£12	0
Acetate of lime, 14 cwt. at 14s.	9	16
Wood naphtha, 52 gals. at 5s.	13	0
	£34	16

SIR R. KANE AND MR. SULLIVAN.

Sulphate of ammonia, 20 cwt. at 12s.	£12	0
Acetate of lime, 4 cwt. at 14s.	2	16
Wood naphtha, 52 gals. at 5s.	13	0
	£27	16

These results have a very attractive appearance, even in both cases; but a closer examination of the subject of peat working from a commercial point of view, led me to the conclusion that it is a fallacy to regard these products as constituting a source of profit to be obtained in working peat. On the contrary, I consider that no reliance should be placed on the value of these products as contributing in any way towards the possibility of peat being worked advantageously. They should be regarded strictly as waste or bye products, and the question whether peat can be worked remuneratively must be determined by regarding the oils and paraffin alone as the staple products. If these can be obtained in such proportion, and at such a cost as to afford a profit on the manufacture, it may then become a question to consider whether the bye products obtained in that manufature are not worth working up for the sake of the ammoniacal salts and other materials they would yield. This question would be determined one way or another by a variety of circumstances of more or less special nature. Among others, the possibility of making some portion of the waste of the chemicals employed in the purification of the oils and paraffin, available for working up these bye products, would be of prominent importance, inasmuch as that would, to some extent, reduce the cost of purifying the oils, &c.

I shall have occasion afterwards to point out results corroborative of this view as to the really valuable products of peat.

Keeping this principle in view, meanwhile, I will now request your attention to the production of paraffin and oil from peat. In the early part of 1858, I was consulted as to the possibility of working the tar obtained from the peat of the Island of Lews, one of the Hebrides. The peat occurring in this island is, as I have before mentioned, a true mountain peat, and, like most of the peat in the Highlands of Scotland and north of Ireland, is a remarkably rich bituminous variety. It is of a dark brown or black colour, and heavier than water, weighing sometimes as much as 78lbs. the cubic foot. It burns with a brilliant white flame, of great length, and considerable heating power, indicating the presence of a large amount of bituminous substance.

The tar obtained from this peat by distillation was quite solid at the ordinary temperature; it was of a dark brown colour, with a penetrating odour of creosote, and melted on the fingers like butter in consequence of the paraffin it contained. Its density was 0·960.

The analysis of this tar showed that it yielded hydrocarbon oil and paraffin of good quality. Two samples, one made in a close retort, the other in a kiln, gave the following results by weight:—

	Retort.	Kiln.
Refined Oil and Paraffin............	42·161	41·167
Creosote	30·459	47·068
Charcoal gas and waste.............	27·380	11·765
	100·000	100,000

These quantities correspond respectively with 112 and 107 gallons of refined oil and paraffin from the ton of tar.

About a ton of the tar was then operated upon for the purpose of getting the products in such quantity as would admit of their being tested as to their applicability for various purposes.

The oil obtained from the tar was purified by the ordinary methods of treatment applicable to such materials, and was then separated by distillation into two portions; one portion of the oil, amounting to about one half of the gross refined product, was quite liquid even at low temperatures; it was of a pale yellow colour, with a slight and not unpleasant smell. It burnt well in the lamps commonly used for hydro-carbon oils, with a brilliant white flame. It did not carbonize the wick, while burning, or resinify by exposure to the air. Its boiling point being above 300° F, there was no danger of its giving off explosive vapour at any temperature it would be likely to

be heated to when used in a lamp, and, as compared with some other oils of good quality, it gave, measure for measure, a greater quantity of light.

The other half of the oil was partly solid at the ordinary temperature; it consisted of an oil of greater density than the one I have just mentioned, and of higher boiling point, mixed with a great quantity of paraffin partly in solution and partly crystallized. This paraffin was easily removed by a filtering bag and the dissolved portion was separated, by cooling the oil and then filtering it again. The paraffin thus obtained amounted to about one tenth part of the gross refined product. The oil from which the paraffin had been separated was, like the other oil, of a pale yellow colour, and had scarcely any smell. It burnt with an intense white luminous flame, and when mixed with fat oils formed an excellent lubricator.

The proportion of refined oil and paraffin which I obtained from the ton of tar was about 112 gallons in all; in round numbers it might be said that on a working scale the tar on which I operated would give 100 gallons refined oils and paraffin per ton. This was very much less than the average amount of the products obtained by Mr. Sullivan from the Irish peat, as stated in Sir Robert Kane's report; but, on the other hand, the amount of tar obtained from the Irish peat was very small, and I expected, from the difference between the peat operated upon by Mr. Sullivan and that of Lews, that this latter, being of a much more bituminous character, would yield by distillation a larger amount of tar.

With regard to the possibility of carrying on the manufacture of these products on a large scale, everything depended upon the cost at which the tar could be produced. Judging from the results that had already been obtained, it appeared to me that £5 per ton was the maximum price that could be allowed for the tar, supposing it to yield 100 gallons of refined oils and paraffin, and that with this cost for the tar, it would be possible to work it profitably if the purification of the oils did not cost more than sixpence per gallon.

These limits having been fixed as to the cost of tar and refining the oils, it became requisite to ascertain the cost of the peat, the amount of tar it yielded, and the cost of production. At that time the cost of the peat on the moor was 2s. 6d. per ton for cutting, drying, and stacking, by contract, but there were satisfactory reasons for expecting that it could be obtained at a less expense. These expectations were subsequently realised, peat having been obtained by contract in succeeding years at 2s., 1s. 9d., and 1s. 6d. per ton; and some which I had cut under my own direction did not cost more than 1s. per ton stacked on the moor. I now think that from 1s. to 1s. 6d. per ton might be fairly taken as the prime cost of air-dried peat containing 20 to 30 per cent. of water.

The amount of tar obtainable from the peat is of considerable importance. The amount obtained by Mr. Sullivan from Irish peat, in no instance amounting to 5 per cent., and on the average 2·5 per cent, is far too small to admit of the peat being worked profitably.

The influence of an increased yield of tar on the cost of the products, will be very clearly apparent from Table II. (next column), in which the quantity of peat worked per week is throughout taken as 100 tons, and the yield of tar varying from 1 to 10 per cent.

It will be seen that a yield of 3 per cent. tar from the peat would, at the cost of peat and labour assumed in this table, make the cost of the tar £6 6s. 8d. per ton, and that if the refined product from the ton of tar amounted to only 100 gallons, the cost of the oil would be 1s. 10d. per gallon, or far too much to admit of profitable working.

To determine this point, therefore, with certainty, an experimental distillation of the Lews peat—air dried—was made in a close retort; it gave the following results:—

Tar		9·855
Charcoal	Carbon .... 30·25 Ash .... 1·25	31·500
Water		37·875
Gas		21·540
		100·000

which were subsequently confirmed by trials on a larger scale.

TABLE II.

Per centage yield of tar from peat.	Quantity of peat worked per week. Tons.	Tar produced. Tons.	Tar produced. Gallons.	Refined oil and paraffin. Gallons.	Cost of tar made. Peat. 2s. per ton.	Cost of tar made. Labour.	Cost of tar made.	Cost of tar per ton.	Cost of tar equivalent to 1 gall. refined products; these being 100 gals. = 1 ton tar.	Cost of refining per gallon.	Cost of refined oil per gallon.
					£	£	£	£ s. d.	s. d.	s. d.	s. d.
1	100	1	233	107	10 +	10 =	20	20 0 0	4 0	0 6	4 6
2	100	2	460	214	,,	,,	,,	10 0 0	2 0	,,	2 6
3	,,	3	699	321	,,	,,	,,	6 6 8	1 4	,,	1 10
4	,,	4	932	428	,,	,,	,,	5 0 0	1 0	,,	1 6
5	,,	5	1165	535	,,	,,	,,	4 0 0	0 10	,,	1 4
6	,,	6	1398	642	,,	,,	,,	3 6 8	0 8	,,	1 2
7	,,	7	1631	749	,,	,,	,,	2 17 2	0 7	,,	1 1
8	,,	8	1864	856	,,	,,	,,	2 10 0	0 6	,,	1 0
9	,,	9	2097	963	,,	,,	,,	2 4 6	0 5½	,,	0 11½
10	,,	10	2336	1070	,,	,,	,,	2 0 0	0 5	,,	0 11

The tar thus obtained, as I have already mentioned, yielded 42 per cent. by weight of refined oil and paraffin; so that the 100 tons of peat, as compared with the average of Irish peat, would yield:—

	Tons.		Tar. galls.		Crude Oil. galls.		Refined Oil. galls.		Creosote. galls.
Lews peat	100 ...		2,097	=	1,629	=	999	+	630
Irish peat	100 ...		478	=	686	=	357	+	343

In this case, taking the cost of the peat as before, at 2s. per ton, the quantity of Lews peat, equivalent to one gallon of refined products, would cost only 2½d. instead of 7d., as in the case of the Irish peat; and adding in each case 1s. per gallon as the cost of manufacture, the refined oil from Lews peat would cost 1s. 2½d. per gallon, while that from Irish peat would cost 1s. 7d. per gallon.

In the above table the cost of manufacture is taken from the results of actual experience; but the per centage of tar, which I have just referred to as obtainable from the Lews peat, was obtained by distilling it in a close retort. This is not the plan that has been adopted practically, and it is possible that in distilling peat with close retorts, the cost of manufacture would be increased beyond what has been quoted in the above table, by the necessity of using some peat for fuel; if, for instance, it should be found that the charcoal obtained from one operation was insufficient for the distillation of a subsequent charge of peat. If that were the case, the working with close retorts would involve an additional expense for fuel. The peat thus consumed as fuel would, in reality reduce the actual per centage of tar obtained from the peat consumed, and if one-third the weight of the peat were consumed as fuel, the per centage of tar obtained would be, in fact, not 9·8 per cent., but only something like 6 per cent.

At the outset of the inquiry into the working of the Lews peat, it therefore became an important question whether it would not be more economical to work with kilns, as was done at the Irish works; whether the large yield of tar obtained with retorts was not to some extent only apparent; and whether a smaller yield of tar, obtained by means of kilns, might be more advantageous by reason of their smaller original cost, and of their requiring a smaller expense for labour and fuel in working than retorts.

The small amount of tar obtained from the peat at the Irish works was, no doubt, partly a consequence of the infe-

rior character of the peat; but a little consideration of the circumstances under which the peat was distilled will suffice to show that it was mainly attributable to the use of the blast employed for maintaining the combustion, in the same manner that it is employed in an iron-smelting furnace. Some results are indeed mentioned by Mr. Reece, and quoted by Sir Robert Kane in his report, which clearly suggest this view. Thus, for instance, Mr. Reece states that, in the experiments made in Antrim in 1850, with a kiln 3 feet diameter and 15 feet deep,—

When the quantity of peat distilled during 24 hours was $1\frac{1}{2}$ ton, the produce of tar was 70lbs. per ton = 3·1 per cent.
When the quantity of peat distilled during 24 hours was 2 tons, the produce of tar was 40lbs. per ton = 1·8 per cent.
When the quantity of peat distilled during 24 hours was 3 tons, the produce of tar was 22lbs. per ton = 0·98 per cent.
When the quantity of peat distilled during 24 hours was 9 tons, the produce of tar was only 2lbs. per ton.

In the experiment by Dr. Hodges, which gave 4·44 per cent. of tar, the distillation of two tons of peat occupied three days, and the blowing machine employed in that experiment is described as having been "very inefficient," and furnishing only "an intermittent blast of no great power." The same fact is pointed out in Sir Robert Kane's report, as having been observed in the course of the investigation made at the Museum of Irish Industry by Mr. Sullivan. When much air was blown through the apparatus, scarcely any condensible products were obtained; when little air was blown through, the distillation was very slow and incomplete.

This result of a very small yield of tar when a strong blast was used appears to be clearly attributable to the peat having been burnt in the kiln instead of having been distilled; and this view of the matter led me to the conclusion that it would be advantageous to dispense with the blast altogether, as being not only very expensive, but also useless and unsuitable for the production of tar. It appeared to me that a more appropriate means of maintaining the combustion of the charcoal at the lower part of the kiln, so as to produce the requisite heat for distilling the peat at the upper part, would be to have a fire-grate at the bottom of the kiln, and to establish a draught through the fire by exhaustion from the upper end of the kiln. It appeared to me, moreover, that by this means the escape of the tar vapour from the kilns would be facilitated in a much greater degree than by the blast driven into the kilns at the bottom.

This opinion was supported by the result of some experiments made with a small kiln, constructed in this manner, which was worked for some time in Lews. In this kiln the draught was produced by means of a chimney placed at the further end of the condenser, and the yield of tar obtained with this experimental kiln amounted to 5 per cent.

The tar thus produced differed somewhat from that obtained by distillation in close retorts chiefly in respect to the relative proportions of light and heavy oils and paraffin, as will be seen by the following results of the analyses of these two tars:—

	Density.	Retort Tar.	Kiln Tar.
Light oil	(0.820—0·830	18·678	5·147
Heavy oil	0·870	20·165	30·885
Paraffin		3·318	5·135
Creosote		30·459	47·068
Charcoal gas and waste		27·380	11·765
		100·000	100·000

This difference might, however, be owing to defective condensation of the more volatile portions of the tar vapour, as the arrangements connected with the experimental kiln were in many respects very imperfect. Otherwise the tar was as easily worked as that obtained with close retorts and the general result of the trials made with this kiln was so far favourable to this mode of working, that when arrangements were made for erecting works to make six tons of tar a week, it was determined to construct a range of kilns of this description, in preference to putting up retorts; at the same time it was hoped that with a more efficient arrangement for condensing the tar vapour, a larger yield of tar than 5 per cent. might be obtained.

These preliminary matters having been satisfactorily disposed of, preparations for erecting works were commenced in the early part of 1859. The tar kilns were cylindrical brick chambers 5ft. diameter and 12ft. high, with a fire-grate of about 2ft. area at the lower end, and a hopper with a lid at the top for introducing the peat. Ten of these kilns were constructed side by side in a block of brickwork. From the side of each kiln passed a pipe 12in. diameter, which was connected with a main 3ft. diameter, extending round the whole range of kilns, and into which the tar vapour from the kilns was discharged. From this main the vapour passed into a series of pipes 12in. diameter, arranged on cisterns much in the same manner as the condensers of gasworks, but with the difference that there was no water joint. After passing through this condenser the uncondensed gases were discharged into a brick chamber with numerous partition walls, and thence into a large flue running for about fifty yards up the side of a hill on the top of which was placed a chimney 30ft. high.

A tramroad ran along the top of the kilns, communicating with the tramroads diverging through the moor, for bringing up the supplies of peat; and, as the peat burnt away at the fire-grates, a fresh quantity was introduced at the upper ends of the kilns. This charging required to be repeated every two or three hours. The product collecting in the condenser cisterns was a thick creamy mixture of tar and water of a pale sulphur colour, from which the tar was separated by heating it in a large boiler and skimming the tar off the surface.

With this arrangement work was commenced about the end of August, 1860; but, owing to the wet state of the brickwork, and to a temporary difficulty with the workpeople, it was not until the early part of October that the kilns were got into regular working order. From that time the work was carried on without any considerable interruption until the end of February, 1861. The results obtained during this period were far from being satisfactory. In the first place, the tar made did not amount to more than 3 per cent. of the peat consumed; and, in the second place, the quantity of peat worked did not amount to more than 50 tons a week on the average.

The expenses of labour in working the kilns being very nearly the same, whether the quantity of peat worked was large or small, the slow rate of working necessarily increased the cost of the products, and this circumstance has an influence as important in this respect as the yield of tar, as will be apparent from the comparison given in the table on the next page.

Moreover, the rate of working was subject to wide variation. This latter circumstance, which was productive of much inconvenience, appeared to be mainly determined by the state of the wind. During calm weather the quantity of peat worked was not much more than half that worked when there was a fresh breeze. With a dead calm the action of the kilns would sometimes be entirely stopped, and during gales, which were of very frequent occurrence, it was impossible to continue working. The most troublesome effect of these two extreme conditions was the production of a back draught from the chimney, through the condenser, towards the kilns, by means of which air became mixed with the vapours and combustible gases; and, when this admixture reached a certain limit, explosions sometimes took place, which were both inconvenient and dangerous.

The slow rate of working which, as shown by the following table, rendered the charge for labour proportionately much greater, was, to a great extent, a consequence of the feeble and irregular draught produced by the chimney. In addition to this, the tar vapour did not appear to escape from the

Per centage yield of tar from peat.	Quantity of peat worked per week.	Tar produced.		Refined oils and Paraffin.	Peat, 2s. per ton.	Labour.	Cost of tar per ton.	Cost of tar equivalent to 1 gallon of refined oil.	Cost of refining per gallon.	Cost of refined oil per gallon.
	tons.	tons.	galls.	galls.	£ £	£	£ s. d.	s. d.	d.	s. d.
5	50	2½	583	268	5 + 10	= 15	6 0 0	1 2½	6	1 8½
,,	120	6	1398	642	12 + 10	= 22	3 13 6	0 9	,,	1 3
,,	200	10	2330	1070	20 + 10	= 30	3 0 0	0 7¼	,,	1 1¼

kilns through the 12in. discharge pipes with sufficient ease. The consequence was that much tar was condensed among the cold peat at the top of the kiln, and this tar, melting afterwards, ran down to the fire, and was there more or less burnt and destroyed. Hence the small yield of tar.

Since the feeble draught of the chimney was the chief cause of these unsatisfactory results, and since that was itself a consequence of the extreme refrigeration of the vapour and gas during its passage through the condenser, the defective draught might have been remedied by maintaining a fire at the base of the chimney, so as to heat the cold, uncondensed gas escaping from the condenser, where the tar had been deposited, sufficiently to produce a steady draught; but, since the gas escaping into the chimney was highly combustible, this would have been too hazardous a plan to adopt, inasmuch as the weather was frequently so boisterous that it was with difficulty that work could be carried on at all out of doors; and, as the kilns were worked continuously, there would have been much inconvenience attending this mode of working during the very long nights of winter.

Under these circumstances, it appeared to me desirable to have recourse to some mechanical means of producing a draught, that would be constant in its action, easily under control, and which would admit of the gases discharged from the condenser being burnt with safety by the introduction of a water joint between the condenser and the place where they were burnt. A further reason for adopting an arrangement of this kind was the presence, in the uncondensible gases escaping from the condenser, of a large quantity of tar, which was suspended in a kind of vesicular position, and was not separable by any amount of cooling that was practically applicable. The smell produced by the escape of this tarry gas into the air was exceedingly offensive for miles round, and for this reason, as well as for the sake of using the gas as fuel, it was determined to burn it. Moreover, though the separation of this suspended tar could not be effected by cooling the gas, it was easily separated by mechanical means, such as passing the gas over loose bunches of heather. This plan has been adopted while working with the chimney draught, and, so far as the separation of the tar was concerned, it succeeded perfectly. A long brick chamber was connected with the flue leading to the chimney, so that the gases were made to pass along it in a zigzag course by coming in contact with bunches of heather tied to cords and suspended from the roof of the chamber. The effect of this arrangement in separating the suspended tar was instantly recognisable, the gases escaping from the chimney being almost free from tar. But the draught of the chimney gradually decreased, and at the end of two or three weeks had ceased altogether. On opening the chamber it was found to be entirely choked with tar that had been deposited upon the bunches of heather like drifts of snow. This circumstance suggested the introduction of several such chambers into the condenser, and it was also expected that the passage of the vapour and uncondensible gas through water would have a similar influence in separating this tar. But to overcome the resistance that would thus be offered to the passage of the vapour and gas from the kilns, it was necessary to have a very powerful draught, and, after considering the various means employed at gasworks for exhausting, I decided upon trying the effect of a revolving fan. A very excellent form of fan of great power was suggested for this purpose by Dr. Rankine, but, as time was a considerable object, one of the ready-made fans manufactured, under Schiele's patent, by the North Moor Foundry Company, was chosen for the trial.

In order to get a satisfactory result in working the kilns it was necessary to work up at least seventy tons of peat a week, and to obtain fully 5 per cent. of tar. Assuming that by the application of a fan this result was obtained, then the quantity of uncondensible gas passing away from the kilns might be taken as consisting essentially of the carbonic oxide produced by the combustion of the coke or charcoal yielded by that quantity of peat, plus the oxygen of the air required for its combustion. Taking the peat to yield 25 per cent. of charcoal, and the quantity worked as ten tons daily, there would be some 4lb. of carbon to be converted into carbonic oxide per minute in the kilns. This quantity would require rather more than 300 cubic feet of air, which, by conversion into carbonic oxide, would become about 360 cubic feet, and, at the temperature it entered the fan, might amount to 500 cubic feet. This, then, fixed the minimum capability of the fan to passing 500 cubic feet of gas per minute, even if the quantity of peat worked did not exceed seventy tons a week. But this rate of working was considered too small, and I was desirous of increasing it to double or three times as much, and with that object decided upon employing a fan capable of passing 2,000 cubic feet of gas per minute, so as to leave an ample margin for increasing the rate of working, and to allow for any augmentation of the volume of gas not calculated for.

The fan chosen for this purpose was a 30 in. Schiele's fan, driven at a rate of 1,600 revolutions by an 8 in. engine, which worked some pumps and a winding drum, by which the peat trucks were drawn up an incline to the kilns. This fan was found to produce a powerful steady draught through 7 in. of water, without raising the combustion at the fire-grate of the kilns to a higher degree than was desirable. The area of the discharge pipes from the kilns having been doubled, the vapour was rapidly drawn from the kilns, and the tar was much more completely separated by passing the vapour several times through water and through four chambers filled with layers of heather. The mechanical action of the fan was also found to be very efficacious in separating the suspended tar, which appeared to be churned out of the gas by the fan.

The current of gas discharged from the fan was highly combustible, and burnt freely at the ordinary temperature. In order to prevent its causing an unpleasant smell, and to render it available as a source of heat for generating steam, distilling tar, evaporating liquors, or drying, it was led through an underground tunnel to a furnace, where it burnt with a flame from 6 ft. to 10 ft. high, 6 ft. long, and 6 in. thick.

In working with the chimney draught it had become apparent that the quantity of charcoal produced from the peat, as it passed from the top of the kiln to the fire-grate, was very much greater than was requisite for distilling off the tar from the subsequent charge of peat, and consequently there was considerable waste of time, besides other obvious disadvantages, involved in the combustion of this surplus fuel. To remove this obstacle to the increase of the quantity of peat worked in the kilns, an arched opening was made in each kiln, just above the fire-grate, and fitted with a door, through which the charred

peat could be drawn out at intervals, in such quantity as to leave only just enough to serve as fuel for distilling the peat. This plan could not be regularly carried out during the last winter, on account of the danger of opening the doors of the kilns during high winds while the front of the kilns was unprotected by sheds. It was nevertheless found that by drawing out the surplus charcoal the quantity of peat worked was very much increased, and a very much more considerable advantage would have been gained in this respect if the removal of the charcoal could have been effected independently of the weather.

In illustration of the effect of these improved arrangements it may be mentioned that the quantity of peat worked was considerably greater that when working with the chimney draught, being in all cases upwards of 70 tons a week, and while the weather was favourable for drawing the surplus charcoal, upwards of 100 tons a week. The yield of tar was also increased to the extent of 7·5 per cent. of the peat worked, and was on the average as much as 7 per cent. The number of men required for working the kilns was also much smaller than was the case while working with the chimney draught. These results were in every respect very much more favourable than what had been anticipated at the outset, inasmuch as the cost of the tar, instead of being £5 per ton, was under £3 per ton, while on the other hand the quantity made per week, instead of being only 6 tons, was upwards of 7 tons, and was also in a fair way of being increased.

One of the products obtained from the peat tar was a burning oil of excellent quality, similar to paraffin oil and the oil obtained from American petroleum. It was sold last winter in Glasgow, under the name of lignole, and was examined by Dr. Anderson, who expressed his opinion that it would compare favourably with the best varieties of mineral oils obtained from coal. The production of this oil is an important feature of novelty in the working of peat.

The heavier oil obtained from the tar would burn very well, but it requires a different form of lamp from that generally employed now for the hydro-carbon or so-called paraffin oils. When mixed with fat oils it forms a good lubricator. Some samples of this oil, mixed in proportions suitable for the spindles of cotton machinery, were examined by Dr. Rankine, of Glasgow, who reported on them as follows. The standard of comparison was sperm oil:—

"The following table shows the results, the oils being arranged in the order of their friction-reducing powers, as shown by the number of revolutions made by the spindle:—

	Relative lubricating power.	Number of Revolutions.
Oil No. 5	101	416
Sperm oil	100	411⅔
Oil No. 3	98	404
,, No. 2	97	401½
,, No. 1	85	349½

"The conclusions are that the oil No. 5 is somewhat superior to sperm oil as a lubricant, and Nos. 3, 2, and 1, somewhat inferior; but in the case of Nos. 3 and 2 the inferiority is only slight."

"I have not yet had an opportunity of testing by direct experiment the lubricating effects of these oils, or of compounds containing them, on the bearings of large and heavy machinery. The principal difference required in unguents for different kinds of machinery depends on the intensity of the pressure at the bearings; the more intense pressures requiring thicker or more viscid unguents, that they may resist the tendency of the pressure to force them out. Additional thickness is given to an unguent, when required, by dissolving a sufficient quantity of solid greasy matter in the oil; and from previous observation of the properties of unguents containing oils analagous in their chemical character to those with which I have been furnished from the Lews Chemical Works, I am satisfied that the latter oils may easily be thickened in the same manner, so as to adapt them to any intensity of pressure at the bearings to which they may be applied."

The apparatus by means of which these oils was tested, as regards their application to cotton machinery, consisted of a cotton spindle, supported in a vertical position upon a pivot lubricated with the oil to be tested, and carrying a fly or revolving disc. This spindle is set in motion by a constant weight, descending through a constant height, and allowed to revolve freely until it stops of itself, the whole number of revolutions made before stopping being counted by the aid of suitable mechanism. The greater that number of revolutions, the more perfect is the lubrication produced by the oil; and, inasmuch as the bearing at which the friction is tested, is that of an actual cotton spindle, the results of the experiments give a peculiarly satisfactory test of the qualities of the oils for lubricating these bearings, and bearings of light machinery in general.

Having already referred to the Irish Peat Company's works, and to the results obtained there, I would now wish briefly to point what appears to have been the circumstances which contributed to the signal failure of that undertaking. Table III. (next page) contains a comparative statement of the results anticipated from the working of Irish peat, and of the results actually obtained.

Together with these results are given, also, comparatively, the results obtained at the Lews works by myself.

The prices set down for peat, and for the products obtained from it, are the same in the different cases, except in the statement of the working results of the Irish works in 1855. In that case the cost of the peat is set down as 4s. per ton, as reported in one of the official documents of the Company to have been the cost. The value assigned to the oil, in this case also, is not 5s. per gallon, as given in the Company's report, but 2s. per gallon, which I belive to be nearer its true value, and which admits of the results being compared with the other cases, in which that is the value set upon the oil.

The difference between the anticipated and the actual value of the ammoniacal salts, acetate, and naptha, produced from the peat, is strikingly great, and I think it affords sufficient confirmation of the opinion I have already expressed as to the impropriety of regarding these products as constituting any source of profit in working peat, except when the manufacture of the other products is in itself remunerative.

But if these products are disregarded, the amount of oils and paraffin yielded by the Irish peat is so small, as compared with the cost of production, as to leave no possibility of profit. In addition to this, it may be mentioned that the quality of the oil produced at the Irish works was very inferior, and bore no comparison to that of the oil produced at the Lews works. The manufacture of burning oil, indeed, was not attempted at the Irish works in consequence of the offensive smell which the lighter portion of the oil possessed.

On the other hand, the yield of oils and paraffin from Lews peat is from three to four times as great as that obtained from the Irish peat, while the cost of working is but very slightly greater. The cost of peat in the two cases is also very different, for while in Lews, the peat never cost more than 2s. 6d. per ton, and has since been obtained at a much lower rate, the cost of peat at the Irish works was 4s., and even as much as 6s. and 7s. per ton, a circumstance which in itself would be inconsistent with the possibility of working even such peat as that of Lews.

With these facts so clearly apparent, it is not a matter for surprise that the results obtained at the Irish works were not sufficient to afford a return for the enormous expenditure of capital on the works that were established; and to those who take an interest in the subject of peat working it must be a source of regret that the attempt to work the Irish peat was made and followed up with such

rash precipitation, and with so little preliminary examination of the capabilities of the material for working which such a large investment was made.

TABLE III.

	1		2		3		4		5		6		7	
	Anticipated results from the working of Irish peat, as set forth in the Company's prospectus, on the authority of Mr. Reece, 1851.	Value.	Sir Robert Kane's report, 1851.	Value.	Working results with Irish peat, as given in Mr. Sullivan's report to the Directors of the Irish Peat Company, 1855.	Value.	Retort tar from Lews peat, 1858.	Value.	Kiln tar from Lews peat, 1858.	Value.	Working trial of 1 ton kiln tar from Lews peat, 1858.	Value.	Working result from Lews peat since the fan was used, 1861-62.	Value.
		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.
Quantity of peat worked ..	100 tons.	10 0 0	100 tons.	10 0 0	100 tons.	20 0 3	100 tons.	10 0 0	100 tons.	10 0 0	100 tons.	10 0 0	100 tons.	10 0 0
Sulphate of ammonia ...	20 cwt.	12 0 0	20 cwt.	12 0 0	3 cwt.	1 16 0								
Acetate of lime	14 cwt.	9 16 0	4 cwt.	2 16 0	—									
Wood naphtha, 5s. per gallon	52 galls.	13 0 0	52 gals.	13 0 0	10 gals.	2 10 0								
Crude oil, 1s. ,, ,,	300 galls.	15 0 0	300 gals.	15 0 0	—									
Paraffin, 1s. per lb.	300 lb.	15 0 0	300 lb.	15 0 0	300 lb.	15 0 0	999 gals.	99 18 0	535 gals.	53 10 0	500 gals.	50 0 0	749 gals.	74 18 0
Refined oil, 2s. per gallon ...	...				150 gals.	15 0 0								
Creosote	...						630 gals.		560 ,,					
Total value of products ...	...	64 16 0		57 16 0		34 6 0		99 18 0		53 10 0		50 0 0		74 18 0
Cost of material and manufacture		32 2 0		32 2 0		34 3 4		Cost of working not ascertained.		37 10 0		37 10 0		38 14 6
Balance		32 14 0		25 14 0		0 2 8				16 0 0		12 10 0		36 3 6
Value of oils and paraffin		30 0 0		30 0 0		30 0 0				53 10 0		50 0 0		74 18 0
Cost of material and manufacture		32 2 0		32 2 0		34 3 4				37 10 0		37 10 0		38 14 6
Balance		2 2 0		2 2 0		4 3 4				16 0 0		12 10 0		36 3 6

Under any circumstances the working of peat is surrounded by many serious difficulties as regards both its establishment and prosecution. The districts where peat occurs are generally wild and remote, destitute of all those appliances and facilities for industrial operations which are to be met with in more cultivated parts of the country; the climate inhospitable and unfavourable for out-door work, and the inhabitants—accustomed to a rude mode of life, disliking work, and strenuously opposed to anything differing from their customary habits—are not easily trained to systematic labour. But these are not impassable barriers; they are merely obstacles which are to be overcome by patient perseverance, and, from the practical experience I have had of this subject during the last four years, I feel convinced that such peat as that occurring in the Western Islands and in the Highlands of Scotland, may be worked advantageously; and that, if the manufacture of these oils, which have now become such an important article of commerce, be carried out with earnestness and perseverance, it will become a means of greatly improving the condition of those districts in every respect, and a fertile source of profit to those who carry it out.

DISCUSSION.

The CHAIRMAN said a great number of interesting facts had been laid before them relative to peat, showing what could be done, and what could not be done, with it. It had been very clearly shown that as fuel it could not compete with coal under ordinary circumstances. One question which occurred to his mind as not uninteresting in connection with the use of peat, was suggested by some recent experiments for making gas from it. It was well known that wood, when treated like coal for gas, yielded it in considerable quantities, which, though at present unavailable for illuminating purposes on account of the large quantities of carbonic acid it contained, might, nevertheless, be rendered fit for use by passing the gas through an alkali, such as lime water, which was capable of absorbing the carbonic acid. Peat was in chemical composition something between wood and coal, and it was not unnatural to imagine that the gas formed by the distillation of it might, by similar treatment, be rendered available for illuminating purposes. Mr. Paul, in the course of his experiments with this material, had probably seen whether much carbonic acid was given off by the distillation of it, and he should be glad to hear that gentleman's views relative to its application to the production of gas.

Mr. PAUL replied that for some long time past he had manufactured gas from peat, to light the works where these products were obtained, and he found that the bituminous black peat of Scotland gave forth an abundance of gas under ordinary circumstances. It contained, as the chairman stated, a large quantity of carbonic acid, and if this were to be removed, much washing would be required; but the bituminous black peat in Scotland produced gas of good illuminating power which required no purifying at all for ordinary purposes, such as those to which he had applied it. He had made no reference in his paper to the applicability of peat for gas making, which, he believed, was a matter well worth consideration, because he thought, under present circumstances, the use of peat for gas depended very much upon the peculiar preparation of it of such consistency and character that, when distilled for gas, it would leave behind a coke of commercial value. That had not yet been done, as far as he was aware, but if it could be accomplished at a price which would be commercially remunerative, peat would undoubtedly become an important gas-making material.

Mr. KEATES said he had made experiments himself upon the manufacture of gas from peat, and had succeeded in obtaining as much as 10,000 cubic feet per ton, but the per-centage of carbonic acid was very large indeed; in some cases amounting to 22 per cent., which was practically a prohibition of the use of the gas until some cheap means was found of removing that impurity, which greatly reduced its lighting power. It could not be

washed out by being passed through lime water. The absorption of 20 per cent. of carbonic acid gas from a gaseous mixture by means of lime, was, in his opinion, impossible in practice. He believed, however, that the constituents of the carbonic acid might, instead of being produced as carbonic acid, be produced in the form of carbonic oxyde, and then the difficulty would be removed as far as carbonic acid was concerned. Those acquainted with gas making, knew that the existence of even a small quantity of carbonic acid in gas for illuminating purposes reduced the lighting power in an extraordinary degree, and to that extent lessened the practical value of the gas. He should like to hear what per-centage of carbonic acid Mr. Paul had found in his experiments. In his own he could state that the amount ranged from 15 to 20 per cent., and the experiments were made upon several evarieties of peat, more particularly Dutch peat. Another important point for consideration was that no practical means had yet been found of bringing the peat into a condition of leaving behind a valuable coke, which in gas making from coal formed an essential element in a commercial point of view. The coke produced from ordinary dried peat was so deficient in density as to be of little value.

Mr. Brunton thought he could throw a little light upon this subject, especially upon the point just alluded to. He agreed with the last speaker as to the essential importance of producing a coke as one of the results of making gas from peat. He thought it probable that Mr. Paul was not aware of a process of treating peat which had been under experiment for the last eighteen months; but he begged to introduce to the meeting specimens of peat merely dried and not compressed, which, when subjected to charring in a gas retort, would produce a charcoal of considerable density. Mr. Brunton having handed in specimens of this peat, and the charcoal produced from it, proceeded to remark that he thought these would show that the difficulty with regard to the production of a solid charcoal in the retort had been got over. Trials made with peat prepared in that manner had shown not only that there was a large amount of gas in the peat, but that the gas was of such high illuminating power as to bear advantageous comparison with gas distilled from coal, whilst the difficulty of the carbonic acid gas alluded to by the last speaker was done away with, in a great measure, by a previous partial charring or baking of the peat before it was used for the manufacture of gas. Mr. Brunton produced specimens of the coke from peat, which was used in the manufacture of pig iron, a specimen of the latter being also shown made in a blast furnace, which he said was a satisfactory proof of the density of the charcoal. The meeting, he went on to remark, might be curious to know how that density was produced without mechanical pressure. The specimens he exhibited, he said, were moulded in an ordinary brickmaking machine, without much pressure, and it became equally hard if rolled into a ball by the hand. The price at which that peat could be manufactured on the bog, did not exceed 5s. per ton. Now, while he quite agreed with Mr. Paul as to the comparative valuelessness of air-dried peat, and the uselessness of pressing it, he would call his attention to the fact that trials with this peat upon a sufficient scale—not in a laboratory, but under the boiler of an ordinary steam-engine of 20-horse power—had demonstrated that the peat, as a heating power, did two and one-third times the duty of coal. In other words, while the consumption of coal in the furnace was 12 cwt. per hour, an equal quantity of peat prepared in this way lasted two hours and twenty minutes, producing the same amount of steam per hour, and doing the ordinary work of the engine. The peat that was used on that occasion was of the same description as that which he now exhibited. The experiments were conducted by Mr. Versmann, who, had he been present, would have given the chemical details more satisfactorily than he (Mr. Brunton) could do. Mr. Versmann came to the conclusion that the peat, as prepared by this process, was a most valuable material for gas purposes, and that it would produce from 12,000 to 14,000 cubic feet of gas per ton, of an illuminating power exceeding that of ordinary coal gas, the amount of carbonic acid not exceeding 10 per cent.; and although that was somewhat in excess of the average of coal gas, yet there were advantages in peat which more than counterbalanced the disadvantages arising from the excess of carbonic acid. He merely wished to call their attention to the fact that there was now a mode of preparing peat which would produce the description of fuel which he exhibited, which had produced results as a heating power equal to two and one-third that of coal, and from which iron had been manufactured in Ireland, which had been pronounced equal to Swedish or Russian iron. The specific gravity of this fuel was nearly equal to that of coal, and the specific gravity increased as the material became drier in process of time.

Mr. W. E. Newton said, this being a subject in which he had taken considerable interest, and having read a paper upon it before the Society two years ago, he might be allowed to offer a few observations. With reference to the paper read this evening, he would say there were many things with which he cordially agreed, and many others from which he entirely dissented. As regarded the calorific power of peat, as used by Mr. Paul, he did not question the correctness of his experiments, but he was very glad to hear—or rather, to have his own impressions confirmed—that peat, if properly prepared and properly used, gave a calorific power equal to, if not greater than, coal; but the use of peat in manufactures was of greater importance than simply as a fuel for heating purposes. The use of peat in metallurgic operations was a more important thing in this country than merely as a substitute for coal as a heating agent, while they had abundance of the latter at the present time. A great many experiments—more particularly on the continent—had been made with peat as a fuel for metallurgic purposes, and Mr. Siemens and others had found that it produced iron of very superior quality. He had seen specimens which came up to the best quality of Swedish iron. Every iron manufacturer knew that if he could get peat to stand the blast—and the process described by Mr. Brunton gave it—then it was infinitely superior to coal for those purposes, for the simple reason tnat it contained no sulphur. They could produce iron with peat from the worst brands which would almost equal the best Swedish or Russian iron, simply owing to the absence of those deteriorating chemical agents which existed in coal. As regarded gas, he could confirm what Mr. Brunton had said that this peat would produce an enormous amount of gas, something astounding in comparison to that which was produced from coal, and the samples of coke he had seen, as the residuum of peat, were equal in density to that from coal, and were all that the iron manufacturer could require. But one of the chief advantages of the process was that they did not require to convert the peat into coke. The hard specimens which had been introduced this evening by Mr. Brunton were found to be everything that could be desired for the manufacture of iron. He had seen specimens of peat charcoal produced by other processes, which were exceedingly good for various purposes, such as for fertilisers of land and disinfectants. In the paper which he read two years ago, a number of results were stated, which, at the time, excited a great deal of attention on the part of those interested in the question. He thought one of the reasons why they had not succeeded in bringing the manufacture of the products of peat into more general use, arose from the fact of people wanting to do too much. If they analysed a sample of peat and brought out a string of a dozen or twenty substances to be obtained from it, and if they attempted to obtain all those substances, it was cleai they would fail commercially; but if a man confined himself to taking the peat from the bog, and preparing it for somebody else

to manufacture, he would probably succeed commercially. If, for instance, he took the peat as prepared by Mr. Brunton, and submitted it to the gas distiller, he would get a useful product in the form of charcoal which was in itself more valuable than the peat before it was distilled; also another product in the shape of grease or tar, which he recommended them not to touch themselves, but to sell it to those whose business it was to treat those products, and who would get the greatest amount of commercial value out of them.

Mr. Heal said reference had been made in the paper to the Irish Peat Company. He had some knowledge of the formation of that company, but had never heard what its commercial success had been. It would, therefore, be interesting to him—if not to the meeting generally—if Mr. Paul would inform him what was the result of that undertaking after having been in existence, he believed, three years. It was projected by men of considerable standing and eminence, but he never heard of the company after it was launched, and did not know what had been the commercial result of it.

Mr. Newton said the Irish Peat Company started with the intention of getting everything out of the peat, and, consequently, they failed.

Mr. E. C. C. Stanford said, as one of the few who had visited the Lews establishment, and having, through the courtesy of Mr. Paul, inspected the works there, he would say a very few words on this subject. None but those who encountered them could form any idea of the difficulties of carrying out such a manufacture in those islands, where everything had to be imported—talent, and, no doubt, to a great extent, the workmen. Whether they looked at the population—their ignorance and prejudices, or whether they looked at the difficulties of drying the peat in the short season that was available for that purpose, they must regard it altogether as a work of great difficulty, though not insuperable. He was much struck, in looking over the factory, at the way in which the difficulties had been met and overcome, and he thought they were much indebted to Mr. Paul for the manner in which he had described the modes of obtaining paraffin oil from peat. The failure of the Irish Peat Company no doubt arose from what Mr. Newton had told them; but another reason for their non-success might be assigned. They adopted, amongst other things, a most powerful blast, an arrangement likely to blow the products of combustion, not into, but through the condensers, and it appeared that they lost ground very much in that particular point. Then, again, he considered the introduction of the fan spoken of by Mr. Paul a great improvement upon the Irish Peat Campany's process. This was a very excellent arrangement, and everyone who had noticed the difference between the steady working of a fan and the inconstant action of a chimney, would admit that the plan of Mr. Paul was a step in the right direction. The whole subject was one to which great attention should be paid, for we really knew less about these islands of the Hebrides than we did about our distant colonies. The Hebrides, the Shetland, and the Orkneys, at present produced very little to their owners. No doubt if their resources were properly developed—if the peat were worked, to which he would also add the seaweed—the land cleared of peat would no doubt bring a far greater revenue to the owners, who were not generally—though they ought to be—the first to carry out any great measures of improvement.

Mr. John Cassell said it struck him that, if the Irish Peat Company did not succeed in the production of paraffin oil, under the very favourable circumstances in which that company was placed, he did not see how success was ever to attend any operations for the production of paraffin, and paraffin oil from peat; for when the Irish Peat Company was in operation, the American petroleum had not been brought into the market. He did not see how it was possible for the manufacture of paraffin, and paraffin oil from peat, to compete with the petroleum. Here they had a product, furnished by nature, ready for distillation, and they knew it could be distilled at small cost. Mr. Paul had told them the quantity of paraffin that could be produced from peat, but he had given them no statistics as to the cost of distillation. They knew that there were many substances operated upon in this country which, through the introduction of petroleum, had now become almost valueless. Asphalte might be mentioned as an instance of this. A large company, with a capital of £100,000, was established for the purpose of bringing asphalte from Cuba, which was to be had for the cost of the carriage to this country; but it was found it could not compete with the petroleum, and at the present time circumstances were more than ever favourable to a cheap supply of that article. Hitherto the chief items were the carriage and freight. At the wells petroleum could be had at very small cost, and the price they paid for it in this country had been enhanced by the expenses of transit, but now the Atlantic and Great Western Railway of Canada had carried lines to the wells, by which means they anticipated a very large and cheap supply of petroleum in England. Then when they looked at the power of production, he observed that large manufactories had been established which were capable of refining thousands of gallons of petroleum daily. He could state that he was associated with works where 5,000 gallons of oil per day were distilled and refined at a small cost. Looking at the subject in a practical light, he could not see how it was possible, with the oil from Canada and America, to expect to produce anything like an article of equal value and so free from odour. He should like to elicit from Mr. Paul the cost of production of oil from peat, because the apparatus set in motion for the distillation of petroleum was equally applicable, by the addition of a few retorts, to the making of oil from peat.

Mr. Topham begged to recall the attention of the meeting to the very important statement made by Mr. Brunton this evening, that the peat prepared by him had been proved by experiment to possess a calorific power of two-and-a-third times that of coal. If that were actually the case, a complete revolution would take place in steam navigation, and the dividends of the companies would be increased to an enormous extent, seeing that by this means the cost of fuel would be reduced by fully two-thirds. He should be glad if Mr. Brunton would be good enough to give the meeting the data upon which he had arrived at the results he had announced this evening, viz., that 10lbs. of this peat would evaporate $2\frac{1}{3}$ cubic feet of water, as it was known that it required 10lbs. of coal to evaporate one cubic foot of water into steam.

Mr. Fothergill said having himself furnished the results of the experiments to which allusion had been made, he begged to state that a steamer was placed at the disposal of the parties by whom the experiments were made, and he had attended personally, accompanied by another engineer. Having ascertained what the consumption of the furnace in coal was for a given trip, they commenced getting up the steam with peat, and having weighed out an amount of peat equal to that of coal consumed, they started npon the trial, the result being exactly as stated by Mr. Brunton. Reference had had been made to the introduction of the blast while peat was undergoing a certain mode of treatment in Ireland. He had found that if any kind of peat were subjected to blast it disintegrated, and there was a great amount of consumption, but a poor result was obtained. If they could soften the draught in the chimney, the flame produced was of a very durable character, because the draught was not sufficiently strong to disintegrate the peat. He had tried experiments with it in locomotive engines. He had not a sufficient supply to test it against coal or coke in drawing a given load so many miles at a certain velocity, but he had seen sufficient to convince him that if they had a draught large enough to prevent the flame from disintegrating the peat, they would get a result which would be surprising to everyone. In the first experiment they had a blast of $4\frac{1}{4}$ inches diameter. He

found that was too strong, and it drew the flame through the smoke-box, so that it escaped up the chimney without being made available for heating, which was the case in many instances in steamers. He, therefore, had a fresh blast pipe made of $5\frac{3}{4}$ inches in diameter, and the steam was generated better with the softer blast than with that $4\frac{1}{4}$ inches in diameter, and every engineer would know the wonderful difference which that alteration of the diameter of the blast would make.

Mr. TOPHAM remarked that, upon the facts now stated, he did not think there was any justification for the assertion that peat possessed $2\frac{1}{2}$ times the calorific power of coal, and such a statement ought not be received upon the hap-hazard experiments which had just been detailed.

Mr. BRUNTON said the way in which the result was arrived at was this:—Taking 12 cwt. as the consumption of coal per hour, the same weight of peat was used, which kept up the steam for 2 hours and 20 minutes, maintaining the same quantity of steam, and doing the ordinary work of the engine for the increased period of time he had stated. His statement, he said, was fully borne out by the experiments of Messrs. Jackson and Townson, who had furnished a report to the effect that all the five samples of peat forwarded to them for experiment, possessed much greater heating power than coal, for while the latter took six minutes to bring a certain quantity of water to the boiling point, the same result was produced by the peat in from 1 to $1\frac{1}{2}$ minute. The length and general character of the flame rendered the peat fuel very applicable to reverberatory furnaces. Mr. Brunton added that the importance of these results was enormous, with regard to steamboats, inasmuch as half the space now occupied by fuel would be available for cargo, and there was the further advantage of the absence of all dirt and dust in the case of the peat fuel, with entire freedom from smoke. Although he had spoken of the price of 5s. per ton, it was to be supposed that the manufacturers would require a little profit for themselves; it was not, therefore, to be taken that the fuel in question could be supplied at that price.

Mr. PAUL, in reply to the enquiries and remarks of the gentlemen who had taken part in the discussion, said that as to the making of gas from peat he was not in a position to speak as to the chemical composition of the gas produced. He could only state the results of numerous trials made for the purpose of supplying gas for lighting at the works in Lews. Those trials showed that the peat gave a large quantity of gas of considerable illuminating power. It was sufficiently pure even to be burnt at once, as it came from the retort, and without any purification, and the peat appeared to yield as much gas, or even more, than the best kinds of gas or cannel coal. With regard to the signal failure of the Irish Peat Company's works, Mr. Paul said he considered this was attributable to the disproportionately large expenditure on the works, amounting, as he believed, to upwards of £60,000; also to the improper mode of treatment adopted in working the peat, and, above all, to the very inferior character of that peat, which, according to the results of chemical examination, obtained prior to the establishment of the works, was shown to yield only a very small proportion of oil and paraffin, about $3\frac{1}{2}$ gallons from the ton of peat, while the actual working results gave only 2 gallons from the ton. The cost of the peat at these works was from 5s. to 7s. per ton; so that the cost of oil was upwards of 3s. per gallon, while the highest price that could be expected for the oil was only 2s. 6d. per gallon. Besides this the products which were expected to afford more than half of the profits of the works, were found not to produce more than one-eighth of what was calculated upon. Instead of being worth £12,700 a year, they were worth only £1,752, according to the Company's own returns; and they probably cost more than that sum for manufacture. On the contrary, the Lews peat, which he had spoken of, cost only 1s. 6d. to 2s. per ton; it yielded six or seven gallons of oil and paraffin per ton, and the cost of manufacture was such that these products could be obtained at a cost of about 1s. 6d. per gallon. This was an actual working result obtained from works on a small scale, working about seven or eight tons of tar a week, and carried on with all the disadvantages attending the commencement of such operations in a place where everything was more or less unfavourable. These facts, therefore, established a very great difference between the two cases; on the one hand they showed why the Irish works failed; on the other hand, they showed that the failure of the Irish works was no measure or indication of what might be done with peat of a better kind than that used at those works. As to the possibility of working peat for oils and paraffin, in competition with American petroleum, he would not venture to speculate on what might be the future state of the case with regard to that matter. Petroleum, and the manufacture of oils from it, were undoubtedly great facts, and would doubtless become of still greater importance. But at the present time the cost of crude petroleum was upwards of £15 per ton, or nearly 1s. 3d. per gallon, and there was a tendency to an increase of price. If that increase should take place, the possibility of working peat and other materials would be increased; but if the price of petroleum came down so low as £8 per ton, as was confidently predicted by some competent authorities, then it would undoubtedly drive every other material out of the field. As regarded the application of peat to fuel, and the statements brought forward by Mr. Brunton and other gentlemen, he was fully aware of the possibility of bringing peat into the condition of the samples which had been produced. He knew from his own experience that peat might be so prepared as to have, when dry, a density equal to coal, to yield a compact, hard coke, and to be suitable for making gas and coke and for metallurgical purposes. He would be one of the last to question this undoubted fact. But the question to which he had endeavoured to draw attention in his paper was the practicability of this proceeding as a commercial undertaking. This was the great, in fact, the only question. In the paper he had read, he had pointed out several circumstances which were inconsistent with practicability. Much had been talked about the use of peat in metallurgy, but he could not discover any such application of peat except where coal could not be got or could not be got at a suitable price. As to the remarks which had been made with regard to the fuel value of prepared peat, he was at a loss to reconcile the statement which had been made with the indisputable facts of the composition of peat as compared with coal. According to this, the full value of absolutely dry peat was about two-thirds that of coal. Coal would evaporate only ten times its weight of water, but, according to the statements made that evening, peat would evaporate upwards of twenty times its weight. This was a position so startling and inconceivable that it called for unquestionable evidence in support of it before it could be received as a fact. There was not a shadow of such evidence put forward, and Mr. Fothergill's remarks gave no account of the data from which such extraordinary conclusions had been drawn. The experimental estimation of the fuel value of this prepared peat, as referred to by Mr. Brunton, was obviously quite valueless, and could not for a moment be regarded as having any bearing on the question, or any kind of value whatever. Consequently, the only possible course was to reject the conclusions that had been come to as incorrect.

The CHAIRMAN was sure he only expressed the feeling of the meeting when he thanked Mr. Paul, on their behalf, for the very elaborate paper with which he had favoured them. The question of the manufacture of iron had been discussed in connection with the subject of peat; and, amongst other matters, the case of the Irish Peat Company had been brought forward. He believed if that company had succeeded in making coke from the peat, it would have proved a most profitable application of the

material; but in that they had failed. It would appear, from the views expressed by several speakers, that the value of peat as a fuel for ordinary purposes depended upon its being of a sufficient density to stand the blast; and inasmuch as it was not usually obtained in a dense state, it had not been used to any extent as a fuel. He did not think it was generally known that there was a furnace constructed by Mr. Siemens, by which that difficulty was entirely avoided, and for that reason it was well adapted for the employment of peat. It had an exceedingly slack draught, far more gentle than was used in ordinary boiler furnaces, so that even the lightest peat would not be blown away. This furnace generated combustible gases from the fuel and burnt them, producing a great heat. Another part of the furnace produced a hot blast, and the several applications of those arrangements had given an intensity of heat which had not been obtained by any other means. He had been told by Mr. Siemens that on one occasion he had used peat in a furnace of this construction, and he (the Chairman) had very strong reasons for thinking that in this furnace peat would be found to be a valuable fuel for reducing iron from its ores. The most promising improvement in the manufacture of iron, he thought, consisted in the use of the gases from the fuel; instead of mixing the ore with the fuel with all its impurities, reducing the ore by means of the purified gas. He might add that Mr. Siemens' furnace made gas from peat in an exceedingly abundant manner, and at the same time he had an arrangement for producing an intensity of heat more than sufficient for the smelting of pig iron. With regard to the subject of the comparative heating properties of peat, he thought it would be a pity if the meeting allowed that question, which had long ago been settled, to be now re-opened by the experiments brought forward this evening, conscientiously made, as he had no doubt they were. He did not think they were justified in throwing aside the numerous experiments made by the most competent observers, which had shown that the heating power of peat, weight for weight, was considerably below that of coal. Under some circumstances it might be a more convenient fuel, and in many cases was known to get up heat very rapidly; but to admit its general superiority to coal as a fuel he thought would be a great mistake, as they had the best possible means of knowing to the contrary. He concluded by moving a vote of thanks to Mr. Paul for his able and valuable paper.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 3rd of December, a Paper by Mr. D. Puseley, "On Thompson's Process of Boatbuilding by Machinery," would be read.

The following letter has been received by the Secretary:

SIR,—I very much regret that a previous engagement will prevent my being present at the discussion on Mr. Paul's paper. I have read the proof with which you favoured me with the interest due to so able and clear a report of important and well carried out experiments and workings. The only remark I have to make is that, while adhering to an opinion expressed before the American and Canadian hydro-carbon oils had come into play, that portable light after going through a period, first of animal sources, such as sperm and seal oils and tallow, then of vegetable, palm, cocoa-nut, and rape oils, has now entered on a mineral period of liquid and solid hydro-carbons. I was quite unprepared to see so large a yield as 9 per cent. of valuable tar obtained from peat, and had always believed that Boghead and such like coals (if they be coals), as well as natural tars, like the American and Canadian crude mineral oils, to say nothing of the richer Rangoon petroleum, would render impossible the profitable extraction of artificial tar from peat. I am, &c.,

GEORGE F. WILSON.

Price's Patent Candle Company, Limited, Belmont, Vauxhall, London, 25th Nov., 1862.

THE CHAIRMAN'S ADDRESS.

The following letter has been received by the Chairman of the Council:—

Spring-gardens, November 22nd, 1862.

MY DEAR SIR,—I find that in your opening address to the Society of Arts, on the 19th inst., you have, I have no doubt unintentionally, committed a mistake in the third page, where, in alluding to the late Mr. Walker's work, the "Bishop Rock Lighthouse," you say, "as a difficult and successful work, the Bishop Rock Lighthouse, off the Scilly Islands, may be placed in the foremost rank of engineering skill with those of Smeaton, at the Eddystone, of the elder Stevenson, at Bell Rock." Now, the real fact is, that the Bell Rock Lighthouse was designed by and built under the direction of my father, and the late Mr. Stevenson was simply the resident engineer, appointed at the recommendation of my father, and acting under his directions. These facts are established beyond doubt by the official documents which I have published. Trusting, therefore, that you will correct this at some future opportunity, I am,

Yours very sincerely.

JOHN RENNIE.

Sir Thomas Phillips, Chairman of the Council of the Society of Arts.

Home Correspondence.

INTERNATIONAL EXHIBITIONS.

SIR,—I have carefully considered Mr. Chester's letter upon International Exhibitions, which was printed in your *Journal* of the 14th instant, and I hope you will excuse my troubling you with the following remarks upon it.

The first part of the paper is devoted to the inquiry whether the Commissioners of 1851 are bound to provide assistance to future International Exhibitions; but he carefully avoids the question whether they are bound to provide the deficiency which may occur from the Exhibition just closed.

It is not my intention to touch upon so difficult a subject, but it is clearly one which must engage the attention of the Commissioners, as well as of the Guarantors, should they be called upon for a contribution.

Mr. Chester then proceeds to state that the preservation of the present building is a necessary condition for future Exhibitions, and on these grounds:—that, if destroyed, it is idle to suppose a body of Guarantors will be found to incur the responsibility of erecting another structure, or that other Commissioners will be found to undertake the responsibility of management.

For the sake of the plan Mr. Chester subsequently propounds, for the future of Exhibitions, he is obliged to adopt these conclusions, but in which I fancy many will not agree. There can be no reason why, in ten years time, both Guarantors and Commissioners should not be found as easily as in 1861; indeed, I should say the experience of this year would rather facilitate the one and the other, for under most unfavourable circumstances, we have received £500,000, and the coincidence of this sum with that received in 1851 affords a good datum by which in future times to govern the expenditure; whereas, unfortunately, the sanguine expectations which were entertained of much larger receipts in 1862 than in 1851 led at first to the adoption of a scale of expenditure which will never be repeated, and afterwards to an economy bordering on parsimony; the uncertainty also which hung over the early arrangements led to many hasty and expensive measures which may easily be avoided in future.

Then, again, as leading up to the plan to be proposed, we are told, that besides the cost of ornamentation, and without the annexes, it is estimated that £100,000 would be required to complete the building—that is, I presume, to render it permanent; but I am assured this sum is below

what would be necessary for such a purpose. With the exception of the picture galleries, the building has not an element of permanence about it, and they want one necessary and important feature—they are not fireproof. To make them so would cost a large sum, even if it were thought desirable to retain this portion of the building. Now, without wishing to disparage the building unnecessarily, I would ask who would approve this large expenditure on a building universally condemned, and which even the most determined supporters of the Commissioners can only justify by the circumstances under which it was erected, and which sum is within a trifle of the cost of the building in 1851.

Would not spending £100,000 or £150,000 upon it be throwing good money after bad, and preclude us from showing to the world 10 years hence that this building does not represent the national taste or the talent and ingenuity of our architects?

If I am right in this view, we had better let it be sold at once for what it is worth; let the land revert to the Commissioners, and be available for the payment of whatever may be deficient in the receipts, to liquidate the entire cost of this Exhibition, and this, I believe, will be the most satisfactory termination of the present International Exhibition to the guarantors, to the public, and for our national character.

I might stop here, for the greater part of Mr. Chester's plans, as subsequently detailed, hang upon the maintenance of these buildings. If I have shown that, in the interest of future exhibitions, it is not desirable to maintain them, I have but little more to answer; but there are other views put forward,—as is the case with everything that originates from Mr. Chester,—with such force and skill, and which, in my opinion, are so erroneous, that I must notice them.

The first is "that International Exhibitions should be at shorter intervals than 10 years, and that in the intervals between them there should be smaller exhibitions."

I differ from Mr. Chester in respect of both these propositions.

International Exhibitions, to be successful, must be held at intervals long enough to shew marked progress in art, sciences, and manufactures in all parts of the world. Without this, interest sufficient to excite the curiosity of the nation and of foreign countries would not be attained, and unless it be probable that such progress can be exhibited and the world's curiosity excited, it will be impossible to induce many most important exhibitors—and without whose contributions the Exhibition as a whole would be a failure—to incur the unavoidable expense of exhibiting. It must not be forgotten that a large number of collections of objects are exhibited without any idea of profit, and that the expense and labour incurred in preparing them would not be repeated at short intervals.

Then, if there are to be frequent and smaller Exhibitions of articles to be carefully selected on the sole ground of their having merit, who is to take the responsibility of rejection, and what kind of merit is to ensure admission?

Mr. Chester will reply, the Committees which he proposes to organise will decide these questions; but I venture to doubt whether any Commission formed as he contemplates would give nearly the satisfaction he anticipates. Then, to manage these smaller Exhibitions, he proposes an enormous machine, composed of Ministers of State, Commissioners of 1851 and 1861, Presidents of Councils of Scientific Societies, Presidents of Chambers of Commerce, Representatives of Industries, Universities, and Colonies, &c., &c., to a number together of several hundreds, who are to be assisted by "a *few experts*."

It is clear that this great organisation would soon resolve itself into a small Committee of Experts, who would not only fail to satisfy but would soon disgust every one with Exhibitions, National or International.

Then we are told this body might appoint jurors, who are to be paid by fees; but where the funds are to come from we are not informed; and I presume, from fees being provided for the jurors, every other member of this great Institute is to work gratuitously. I believe then that the idea of such a body acting to the satisfaction of the country is chimerical, and that whatever may have been the chaos in the management of 1851 and 1862, it would be infinitely worse in 1868, if besides the management of the proposed "little goes," the organisation of an International Exhibition in six years time were entrusted to it.

If little Exhibitions are wanted, they will be easily supplied; and surely the Crystal Palace is a good place for them; but do not let us trifle with, or try to interfere too much with, International Exhibitions. Their exceptional character is one great element of their success; their suddenly calling into play a large number of new men, whose energies are devoted to a special object—has great advantages, and the very confusion which Mr. Chester dilates upon at such length, and I think exaggerates, evincing, as it does, the intense interest of the public, is not without benefit.

But there is a portion of the mis-management of this year's Exhibition which need not have occurred, and which the experience now gained will prevent for the futnre—I mean the almost entire exclusion from the staff of 1862, of those gentlemen who did good service in 1851. I will not mention names, but half-a-dozen will occur to everyone who recollects the proceedings of 1851, and whose services, had they been enlisted this year, would, I believe, have prevented many of the errors of detail which have arisen.

Now we have had the experience of two International Exhibitions, we do not want to establish an elaborate machine having only important duties to discharge, even according to Mr. Chester's plan, once in six years, either to enable us to avoid the errors of 1862, or to prepare for another to be held 10 or 15 years hence.

Having been led up to this new "Institute" we have another set of reasons assigned for doing something with this building after £100,000 or £150,000 has been expended upon it. If this expense be incurred, and we have annual Exhibitions, then, Mr. Chester says, we must have new roads and improved access to the building, so that the roads and accesses which have brought from 50,000 to 60,000 persons daily to this year's Exhibition are not, in his opinion, sufficient for the visitors to smaller annual Exhibitions. Without new roads we are told the value of the Kensington estate will depreciate, and that with them the value of the property of the whole neighbourhood will be incalculably increased. This last reason for the improvements suggested is easily understood, but surely the proposed Institute is not to enter upon such works in the interest of International Exhibitions and as an element of their financial success.

What, then, are the improvements suggested, and what will they cost?

1. A direct road across the park. 2. The sale of the site of the Eastern annexe to any railway company which will make a railway under Hyde-park to the nearest station of the Underground Metropolitan Railway; and 3. A sunken road along the wall of Kensington-gardens.

These are certainly not inexpensive improvements to be undertaken with a view to retain the present building, and I venture to submit it would be far better and cheaper to destroy the building at once than to retain it at such cost. To uphold an unsightly building, which if pulled down can be adequately replaced when wanted, for £250,000, on such terms as these, appears to me to be as unwise as extravagant.

There are several other points in Mr. Chester's paper which I have not touched, but the length of this letter precludes my entering upon them.

I am, &c.,

WILLIAM HAWES.

THE CHAIRMAN'S ADDRESS AND THE FUTURE POLICY OF THE COUNCIL.

SIR,—The account of the proceedings of the meeting of the 19th inst., and the letter of your correspondent "Philip Palmer," which appeared in the *Journal* of last Friday, compel me to claim the insertion of this communication in your next number.

The nature of the address to be delivered on the above occasion is indicated by the 10th bye-law, to which I referred. It states that "the Chairman of the Council shall deliver an address to the Society at its first ordinary meeting after his election, declaratory of the policy which the Council propose to follow during its year of office." Five months having elapsed since the Council was elected, I remarked that the arrangement must be defective under which the policy of a year of office was not declared till nearly half the period had elapsed.

An important fact which I stated, but which is omitted in the report of my observations, is that the Council had no objection to the meeting to decide on a memorial of the Prince Consort for the Society when they thought (as they said) it would not be successful, but when they found that the members really took up the matter with great interest, and that the proposal was likely to be most successfully carried out by the members, the Council used every exertion to oppose it. The animus of the Council was clearly shown in their announcement, that they did not even approve of, or support the, resolution of the General Meeting, to the effect that they (the Council) should consider the most appropriate form of the Memorial, and bring it before the members at a fitting time. It is, however, only one of the instances in which the "presiding influence" of the Council has been made manifest, the uniform object of which is to limit within a chosen circle all proceedings from which any credit may be claimed for personal exertions, or devotion to certain objects.

I stated at the meeting that the address did not indicate the future policy of the Council. It might be very good in its way, but it was not appropriate to the occasion. I was unavoidably prevented from being present till a few minutes after the meeting had commenced, but I have since read over the address, and also the letter of your correspondent "Philip Palmer," and I am now more than confirmed in my views. Your correspondent styles himself "an independent member, of 33 years' standing." I also am an independent member of nearly 20 years' standing, and as such I am desirous of seeing not only an independent Council, but one which shall rest its claim to support, not on its exclusiveness, but on its open and candid reliance on the general body of members. I do not think the Council have to thank their champion for his attempt to defend them. Your correspondent admits that it is not improbable but that many members present at the meeting, and who had heard the address, may think that the doings of the past are more faithfully recorded than the future policy, and he says that no member of the Council pointed out the paragraphs referring to the future, though two of them followed me in the discussion. It is unnecessary for me to notice the few commonplace remarks of these gentlemen, as they had no reference to my observations, but I shall proceed to examine seriatim those indications of future 'policy' noted by your correspondent.

1. "The recommendation of a marble bust to the memory of the late Prince Consort." In what manner this is considered a point of 'policy' I cannot tell, unless it is that the Council intend to condescend to carry out the resolution of the General Meeting of members on this subject. It is the more gratifying to me that it should be so, because not only was I in a great measure instrumental in obtaining that expression of the wishes of the members, but the marble bust to be specially subscribed for is *part* of the plan I myself suggested last session, in a letter to a large number of the members. But, if I had heard that part of the address, I would certainly have alluded to it as not being at all a satisfactory settlement of the question. The Society is indebted to the Prince Consort for its present position, not only as a practical and scientific body of eminent national importance, but also for the exceedingly sound state of its finances. In addition to the bust, what could be more appropriate, and more in consonance with the Prince's own views, than the founding of an annual prize under his great name, for promoting the important objects of the Society? At present I shall not further allude to this, but I again simply ask in what way is the recommendation of the bust an indication of future "policy?"

2. "The hope expressed that his Royal Highness, the Prince of Wales, will accept the office of President." Independent of the fact that this is only a repetition of what was announced in the Council's address at the Annual Meeting in June last, when it was stated that the Council "have reason to hope that at an early period the Society may enjoy the honour and advantage of having His Royal Highness as their President," I again ask, is this an indication of their future "policy?" Besides, the election of President rests with the members, and not with the Council.

3. "The opportunity afforded by the renewal of the lease for rendering the building more adequate to the wants of the Society, and the library more easily accessible." This also is a repetition of what we were told in the June address, and it is too ridiculous to ask how such a subject can be called a point of future "policy."

4. "The acting on the precedent of 1852 in having no exhibition next year." This certainly indicates what the Council *don't* intend to do, and, as regards their future policy, is consistent with my view that they do not indicate what they *are* to do. Not doing that which has *not* been before, is scarcely all that constituents expect to learn from their representatives.

5. "The announcement of the papers at the evening meetings before Christmas." This forcibly shows the loss your correspondent felt for the topics in the address in support of his object. The "announcement of the papers" was made in the advertising columns of the *Journal* the week before the address was delivered, and I can scarcely think your correspondent was serious in alluding to it.

6. "The revision of the list of premiums so as best to meet the wants of the present period." This is very vague, and it seems strange that it should be necessary to point out that the Council intend to promote the objects of the Society in the way which enabled it to achieve so much good, but which has been much neglected for some time past.

7. "The intention of the Council to enlist the services of those members who are willing to take part in the work of the Society by assigning special departments of investigation to members classified with relation to subjects with which they have been familiarised by their callings or studies." I will not say that the Council intentionally introduced this into their address in a way to give an impression that they were thus voluntarily offering to enlist the active aid of members in promoting the objects of the Society, and thus appear to adopt a course which might gain them (the Council) popularity. But it is unfortunate for their champion that he should show himself to be so unacquainted with the *duties* of the Council, as to claim credit for them on a point on which they have no option. The 36th bye-law says, "The Council *shall* proceed, as soon as convenient after the Annual General Meeting, to form lists of those who may be considered specially eligible to serve with others on such Committees of Reference, as may be appointed from time to time. To these Committees the Council may refer for examination, advice, and report such discoveries, inventions, improvements, and novelties in Arts, Manufactures, and Commerce, and other matters as shall from time to time be brought under its notice," &c. In announcing this "intention," the Council only do what they are *bound* to do, and it was quite superfluous in them to

have declared that they intended to be governed by the rules of the Society. A large body of the members (and among them your correspondent) who are not acquainted with these rules, would, however, give credit for an indication of "future policy" to which the Council are not entitled as voluntarily emanating from themselves.

I am glad that your correspondent has drawn particular attention to what he calls the future policy of the Council, because it shows clearly the grounds on which they rely, and it has enabled me to prove their fallaciousness. It is not for me to indicate what the future policy of the Council ought to be, but there are important subjects I could name on which their intentions were looked for.

A member of the Council raised an issue which he must have known was not the true one. The object of the resolution was *not* to express the opinion of this Society upon the general conduct, character, and demeanour of the gentleman who had addressed them. It was simply to return thanks for the address, which in itself might be "interesting and excellent," but which I maintain was not appropriate to the occasion. I have not the pleasure of the acquaintance of Sir Thomas Phillips, except from meeting him at the Society of Arts, but I cordially and fully agree with all the remarks that were made respecting his gentlemanly and courteous demeanour on all occasions on which I have met him.—I am, &c.,

J. H. MURCHISON.

Surbiton-hill, Kingston-on-Thames,
November 26, 1862.

PROPOSED SUBSTITUTE FOR COTTON.

Sir,—The serious position of the Cotton manufacture of this country at the present moment endues with unusual interest every question relating to a future cotton supply, or to the discovery of materials capable of being substituted for cotton wholly or partly.

This being so, I am induced, sir, to request your permission to bring before the public, through the medium of the Society of Arts, a short account of a very remarkable source of fibre, with the character of which those who are most closely interested in this important subject ought, in my opinion, to become acquainted.

In September of last year there were brought to my laboratory, by a Mr. Ghislin, from the Cape of Good Hope, some specimens of the bulb of a kind of lily, indigenous to the country about the Cape, which yielded a cotton-like fibre, thought to be applicable to paper-making. I was instructed to make an examination of the bulbs with reference to that question, and, upon investigation, I found that they contained a large proportion of a fibrous substance closely resembling cotton, but rather finer in texture and very soft and silky. I was immediately impressed with the belief that this fibre might be found capable of being spun into thread, and of being applied generally, like cotton, to the production of woven fabrics.

The bulbs from which this fibrous material is obtained are but little known to botanists; they belong to the orders amaryllidaceæ and filiaceæ, but their variety is not well defined. The physical character of these bulbs differs in some respects from that of the common lily; they are closer and more compact in structure, and the layers or divisions of the root hold more firmly together, like those of the onion. The divisions are thick and fleshy, like the divisions of the bulb of the white lily, but this fleshy or parenchymatous mass is developed upon what may be termed a skeleton of fibres, which lie imbedded in the fleshy matter, and run from end to end of the division of the bulb, all lying in the direction of the long axis of the bulb, in a general sense, but interlacing laterally among themselves, so as to give great strength and firmness to the structure of which they make part. The layers of the root are thick and fleshy only when they are fresh; they shrink as they dry, and then the arrangement of the fibres can be traced very distinctly. The length of the fibres seems to be considerable, as, when the division of the bulb is carefully torn across, they can be drawn out slightly; they then separate, leaving soft loose ends exactly like cotton.

A second variety of this bulb, even more interesting in its character than the first, was sent to me by Mr. Ghislin, only a few months since. It closely resembles in most points that which I have described, but differs from it in one most remarkable respect: the fibres, instead of being straight and of a length not exceeding that of the division of the bulb in which they lie, are spirals, every fibre being coiled up in the direction of its length like a bell-spring; the consequence of this arrangement is, that when the layer of the bulb is torn through gently, so as to break the dried-up fleshy matter, but not the fibres, the latter can be drawn out, that is, the spirals can be straightened until they reach a length of 8, 10, or 12 inches. The fibre from this variety of the bulb is also very much finer than that from the first, being more like raw silk, showing a lustrous surface.

In October, 1861, I had one of the bulbs planted. It began to shoot out of the ground in November, and continued to grow during the winter, until it reached the height of about 16 inches; it threw up three long slender leaves, resembling those of the common flag. The leaves died down in March, and the root has remained in a quiescent state during the past summer and autumn, until within the last three weeks; at the commencement of the present month, however, it began to show itself above the ground, and has now pushed up a green shoot about one inch and a half in height.

It is stated by Mr. Ghislin that these bulbs grow in large quantity in the sandy wilds near the Cape of Good Hope, and that they could be cultivated without difficulty. The fibre is easily bleached, and it appears to me that it could be treated by any of the mechanical means employed in the treatment of cotton. I send you some specimens of both varieties of the bulb and some of the fibrous material obtained therefrom. I also send you my growing plant, as it might be an object of interest to some of the members of the Society.—I am, &c.,

THOS. W. KEATES, F.C.S.

Chemical Laboratory, 14, Chatham-place,
Blackfriars, E.C., Nov. 24th, 1862.

Proceedings of Institutions.

Ipswich Mechanics' Institution.—The lecture-hall at the Mechanics' Institution, after undergoing extensive alterations and improvements, was re-opened in August by a morning meeting and an evening entertainment. The building was not by any means an old one, nor was it either inconveniently constructed or ugly, but unfortunately it suffered under such acoustic defects, that more than one professional lecturer had spoken of it as the worst hall in England for a man to speak or make himself heard in. It had a flat panelled ceiling, which was usually pointed to as the cause of the fault; and no contrivance which could be devised was ever found to effect any material improvement. An evil may be borne with for a long period, but a time usually comes when people determine to endure it no longer, and thus it has been with the lecture-hall. It got into a state to require a good deal of repair, and much cleaning and renovating, demanding a considerable outlay to put it into condition; and those who had the management of it had not the heart to spend the money needful for it, knowing that no amount of embellishment would avail against the unfortunate defect of its construction. Mr. Thomas Shave Gowing, the Chairman of the Committee, whose long devotion to the interests of the Institution is well known, ventured at that crisis to look at the matter in a bold spirit. He shrank from spending money upon cleaning and redecorating the surface of the old ceiling, for he felt that every sovereign so laid out might be available towards a real improvement in the hall. He had considered the matter, and had examined other buildings for years, with a view to the

ultimate remedy of the fault of the lecture-hall, and he had become convinced that a roof open to the ridge, with plenty of timber upon the beams, would be all that was necessary. With the assistance of Mr. Phipson, he designed a plan for the improvement; he set on foot a subscription among the members and friends of the Institution, raising, almost entirely by his own exertions in that direction as much as £197, and, with the sanction of the Committee, set about the task of improving the hall on the plan he had conceived. The alterations have been going on for some months, and during the whole of that time Mr. Gowing has been there watching the progress, and directing the details as they suggested themselves, and the consequence has been that the improvements have been carried out step by step, like a a work of art, every advantage being made the most of, and the minutest circumstance turned to account. Other important improvements were introduced beside the alteration in the roof, and some needful work to other parts of the Institution buildings was done at the same time. The labours of the Chairman of the Committee and the expenditure of the money of the members are well paid in the result. The acoustic defect has been entirely removed, and it is now an excellent room to speak and hear in. The appearance of the interior has been improved as well as the convenience of the building. There are now two good entrances to the hall, one for front seats and one for back seats, with a sub-divisional entrance for the gallery. Handsome doors and doorways have been built in both cases, which are an improvement to the street. A new room has been erected over the upper entrance, for the accommodation of lecturers. Another entrance to the gallery has been made from the lobby on the reading-room side of the building, and the alterations effected in building the staircase have made a very important improvement in the reading-room itself, affording increased light, ventilation, and accommodation. In the hall itself a new, handsome gallery front has been introduced, and an excellent alteration has been made to the lecturer's platform. The improvement of the roof alters the entire character of the room. Light and ventilation are now obtained from both ends of the building. The colours used in the decoration were selected by Mr. Gowing, and are admirably assorted and contrasted. The hall is now 38 feet high from the centre of the floor to the ridge of the roof, and it is said that 14,000 cubic feet of space is added to the interior. It is now called the lecture and music hall.

To Correspondents.

ERRATUM.—In the last number of the Journal, page 14, col. 1, line 13, for "100 millions" read "1,000 millions," and line 15, for "30 millions" read "300 millions."

MEETINGS FOR THE ENSUING WEEK.

MON. ...Geologist's Association, 7. Mr. Tomlinson, "On some Processes in the Useful Arts as Applied to the Explanation of Certain Geological Phenomena."
British Architects, 8.
Medical, 8½. Dr. James Bird, "Public Hygiene (concluded). Means of Ameliorating the Physical and Moral Condition of the Masses."
Royal Inst., 2. General Monthly Meeting.

TUES. .. Civil Engineers, 8. Mr. A. W. Makinson, "On some of the Disturbing Forces of Locomotive Engines."
Ethnological, 8. 1. Mr. J. Wright, "On the Human Remains found in the Excavations at Wroxeter." 2. Mr. J. Crawfurd, "On Languages as a Test of the Races of Man." 3. Mr. E. Preiss, "Some Remarks on the Aborigines in Australia."

WED. ...Society of Arts, 8. Mr. D. Puseley, "On Thompson's Process of Boatbuilding by Machinery."
Geological, 8.

THURS...Chemical, 8. 1. Dr. Woods, "On the Estimation of Organic Matter in Drinking Water." 2. Mr. Rodwell, "On the Reactions of Sulphate and Sulphide of Lead with Hydrogen and Carbonic Oxide."
Linnæan, 8. 1. Mr. Mellor, "A Naturalist's Journey to the Capital of Madagascar." 2. Dr. McIntosh, "Food and Parasites of Salmon." 3. Dr. McIntosh, "Shore-Crab."
Royal, 8½.
Antiquaries, 8½.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette November 21st*, 1862.]

Dated 14th July, 1862.

2026. O. P. Drake, Massachusetts, U.S.—A new and useful or improved apparatus for vaporising and aerating a liquid hydrocarbon to be burned for illumination or for other purposes.

Dated 22nd September, 1862.

2588. J. Long, Gorleston, Great Yarmouth—An improved machine for cleansing and scraping streets, roads, or ways.

Dated 21st October, 1862.

2840. C. Trees, Blackfriars-road, and F. C. Belhomme, New-street, Covent-garden—Imp. in hats, caps, bonnets, and other coverings for the head.

Dated 23rd October, 1862.

2853. A. Chaplin and G. Russell, Glasgow—Imp. in obtaining fresh water by evaporation, and in apparatus therefor.
2857. M. C. A. Perkes, Belvedere-house, Rosendale, Dulwich—An equilibrium, double-action revolving rudder, self-balancing drag, and improved steering gear. (A com.)
2859. H. Donald, Johnstone, Renfrew, N.B.—Imp. in machinery or apparatus for bending or straightening metal plates.
2861. J. Field, Lambeth—Imp. in steam engines, condensers, and boilers.

Dated 24th October, 1862.

2863. A. J. F. Vigneulle-Brepson, 30, Boulevart de Beaumarchais, Paris—A siphoidal cistern, with water reservoir for kitchen or other drains in communication with infected sewers.
2865. L. Groux, Victoria Soap Works, near Sheffield—Imp. in the manufacture of soap, and in machinery for that purpose.
2867. J. R. Nicholl, Streatham, Surrey—An improved construction of fire-place or stove grate.
2870. P. S. Devlan, Buckingham-street, Strand—Imp. in the manufacture of bearings, steps, axle boxes, and other surfaces and appliances or articles subjected to friction.

Dated 25th October, 1862.

2873. W. Owen, Rotherham, Yorkshire—Imp. in stoves.
3875. D. Brown and W. Brown, Smethwick, Staffordshire—Imp. in rolling machinery for rolling gun barrels, cannons, and other articles.
2877. W. Clark, 53, Chancery-lane—An imp. in the construction of the joints of cast iron gas and water mains and other pipes. (A com.)
2879. P. Alfraise, 51, Rue de Malte, Paris—Imp. in sewing machines.
2880. T. G. Ghislin, Hatton-garden—Imp. in the treatment and utilisation of certain foreign plants, for the obtaining of useful fibres therefrom.

Dated 27th October, 1862.

2883. J. Chattwood, Bury, Lancashire—Imp. in ventilating rooms and cellars.
2885. J. H. Johnston, 47, Lincoln's-inn-fields—Imp. in heating glass furnaces. (A com.)
2887. F. Lipscombe, 233, Strand—Imp. in purifying water.
2891. J. J. Ridge, Thomas-street, St. John's, Southwark—Imp. in treating certain farinaceous substances applicable to infants' or invalids' food, and in apparatus to be employed therein.
2895. T. Richardson, Newcastle-upon-Tyne—Imp. in the manufacture of sulphate of soda.

Dated 28th October, 1862.

2897. J. Chalmers, 8, Knights-place, Wandsworth-road, Vauxhall—Imp. in armour plating ships of war and fortifications.
2091. H. Allen, St. James's-place, St. James's-street—Improved apparatus for preparing leaves and stalks of plants for being cleaned or dressed for the purpose of obtaining the useful fibres they contain.
2903. E. S. Tudor, Upper Thames-street—Imp. in the purification of lead.
2905. J. Jeffreys, The Rise, Hoddesdon, Herts—Imp. in constructing surface condensors, and apparatus for heating and cooling fluids.

Dated 29th October, 1862.

2907. A. Ripley, Brook-street, West-square, Lambeth—Imp. in the construction of pistons for steam engines, which improvements are also applicable to air and liquid pumps.
2908. A. Shanks and F. Kohn, 6, Robert-street, Adelphi, Westminster—Imp. in hydrostatic presses.
2909. G. Darlington, Minera, Denbigh—Imp. in the manufacture of zinc oxide.
2911. A. Hogg, Londonderry—Imp. in smoothing irons.
2913. W. Clark, 53, Chancery-lane—Imp. in the treatment of copper ores, and in apparatus for the same. (A com.)
2914. I. W. Lister, J. Bottomley, and W. Bottomley, Well-oth-lane, Rochdale—Imp. in looms for weaving.
2915. W. Cooke, 26, Spring-gardens, St. Martin's-inn-the-fields—Imp. in apparatus for ventilating.
2917. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus in connection with the pans of waterclosets. (A com.)
2919. D. Fryer, Carlton-square, Old Kent-road, and J. W. Meears, Annett's-crescent, Islington—Imp. in casks, tanks, or other receptacles for containing petroleum and other oils or spirits.
2921. J. Unsworth, Rochdale-road, Manchester—Imp. in steam engines.

2923. H. P. F. Newham, Nottingham—Imp. in the manufacture or production of reversible shawls.

2924. J. Fletcher, sen., Leeds, and J. Fletcher, jun., Newcastle-on-Tyne—Imp. in forming wrought-iron wheels, and in tools and apparatus for making the same.

Dated 30th October, 1862.

2925. J. Lockwood, Batley—Imp. in boilers.

2927. F. Gregory, Manchester—Imp. in presses for pressing seeds, fruits, hops, and other substances.

2929. J. Eaton, King's Norton, Worcestershire—An imp. or imps. in the manufacture of certain kinds of gas burners for illuminating purposes.

2931. P. Giffard, 66, Boulevart des Batignoles, Paris—Imp. in air guns and other air arms.

2933. J. Birch, New Norfolk street—Improved apparatus for unstopping or clearing from obstructions, drains, water closets, stack, water, and other pipes.

Dated 31st October, 1862.

2937. W. R. Bowditch, St. Andrew's, Wakefield—Imp. in carburetting or naphthalising gas, and in the apparatus employed therein.

2938. H. L. Corlett, Inchicore, Dublin—Imp. in the construction of tuyeres.

2939. G. Dickinson and E. Cooke, Smethwick—Imp. in the construction and ornamentation of metallic bedsteads, couches, and children's cots.

2941. A. Andrews, Birmingham—An improved tool for cutting and rasping pegs in boots and shoes.

2943. G. H. Morgan, Hereford—Improved mechanical arrangements for raising and lowering bodies.

2945. M. C. de Casteras Sinibaldi, 1, South-villas, South-street, Greenwich—Imp. in the manufacture of armour plates for ships, fortifications, and forts, and in the manufacture of plates to be used in the construction and building of ships, and for attaching copper or other like protective metal to the outside of metal plates for making copper bottoms, or bottoms with a similar protection to iron ships, and for other purposes.

2949. W. E. Newton, 66, Chancery-lane—Imp. applicable to the carriages and beds of guns, mortars, and other ordnance. (A com.)

2951. J. G. Marshall, Leeds—Imp. in the treatment of the straw of flax, hemp, and other similar vegetable substances preparatory to spinning the fibre thereof.

2953. J. J. Anderson, St. James-street, Northampton—A new or improved mode and means for the production of leather from waste leather scraps, and also for producing from such waste leather scraps in combination with india rubber, gutta percha, or other like substance, a new material to be used as leather, and for other purposes.

Dated 1st November, 1862.

2955. J. W. Taylor, Newsome, near Huddersfield—Imp. in scouring or cleansing woollen, worsted, and cotton fabrics and other fibrous materials, and in the means or apparatus employed therein.

2961. J. Winter, jun., Wardour-street, Soho—An improved safety tap or cock applicable to gas burners, gas pipes, and vessels containing gas; also water pipes, steam pipes, and vessels containing inflammable and other liquids, compressed air, and spirituous liquors.

Dated 3rd November, 1862.

2963. J. Musgrave, Bolton-le-Moors, Lancashire—Imp. in the valves of steam hammers, and steam, hydraulic, and gas engines.

2965. L. Gonez, 15, Passage des Petites Ecuries, Paris—A seat or chair, forming also a travelling bag for the use of travellers by rail or other way.

2966. F. Trachsel and T. Clayton, Manchester—Imp. in machinery or apparatus for obtaining light, heat, and ventilation, parts of which improvements are also applicable to other purposes.

2967. G. Hollins, Manchester—Imp. in the manufacture of straps or belts for machinery.

2971. D. Scattergood, Nottingham—Imp. in circular frames for the manufacture of looped fabrics.

2972. P. F. C. Cheveron and E. C. Eichenberg, Paris—A new method of, and apparatus for weaving Indian shawls and other figured tissues.

2973. R. A. Brooman, 166, Fleet street—Imp. in machinery for moulding and compressing artificial fuel, peat, bricks, tiles, and other substances. (A com.)

Dated 4th November, 1862.

2975. J. B. Francis, Hullard-hall-lane, Stretford, near Manchester—Imp. in apparatus for raising and lowering window blinds, maps, and other articles, and for retaining them in position.

2976. J. Lefebvre, 54, Rue des Tournelles, Paris—A new or improved instrument or indicating angles or variations of level, and for measuring horizontal and vertical distances.

2977. F. Durand, Paris—An improved cotton gin.

2979. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in hanging, arranging, and operating ordnance. (A com.)

2981. J. Place, Over Darwen, Lancashire—Certain imp. in looms for weaving.

2983. T. Huntley, Manchester—Imp. in kitcheners and kitchen ranges, and in cooking and bath heating apparatuses.

2985. J. Shirt, Tamworth, and C. Briggs, Alders Mill, Tamworth—Imp. in apparatus for condensing the steam of high-pressure steam engines.

2987. A. C. Dewies, Nicholl-square, Aldersgate-street—An improved lubricator.

Dated 5th November, 1862.

2989. J. B. Thomas, Paris—Imp. in apparatus for working and controlling railway signal discs.

2991. J. Banwell, Watlington, Oxfordshire—Imp. in apparatus for punching by means of hydraulic pressure.

2995. R. A. Brooman, 166, Fleet-street—Imp. in spinning frames. (A com.)

2007. A. V. Newton, 66, Chancery-lane—A new process of obtaining printing surfaces, dies, and substitutes for photographic negatives. (A com.)

3001. J. J. Laveissère, 58, Rue de la Verrerie, Paris—Imp. in the manufacture of tubes of copper or other metals or alloys.

Dated 7th November, 1862.

3010. C. O. Heyl, Berlin—Improved means and machinery to be used for the purpose of extracting fatty oils from oleaginous seeds, and for purifying the said oils, and for extracting the agents employed from the exhausted residue.

3012. A. V. Newton, 66, Chancery-lane—Imp. in repeating fire-arms. (A com.)

Dated 8th November, 1862.

3016. H. Kilshaw, Haslingden, and E. Lord, Rawtenstall, Lancashire—Certain imp. in power looms for weaving.

3018. C. W. Spruyt, New Broad-street—Imp. in rails for railways.

3022. G. Kent, High Holborn, and E. P. Griffiths, High-street, Camberwell—Imp. in apparatus for reducing cocoa berries and other vegetable and animal substances to powder or pulp, and for mashing potatoes.

Dated 10th November, 1862.

3026. J. Whitaker, Leigh, Lancashire—Imp. in machinery or apparatus for pulping, stripping, and slicing edible roots for cattle.

3028. S. Berrisford and W. Ainsworth, Stockport—Certain imp. in looms for weaving.

3930. R. J. Chapman, South-street, Camberwell—Imp. in the manufacture of glass and emery paper or cloth.

3032. W. E. Newton, 66, Chancery-lane—Imp. in the treatment of maize or Indian corn preparatory to grinding the same into flour. (A com.)

3034. T. G. Ghislin, Hatton-garden—Imp. in the treatment of certain foreign plants and in the application of the fibres derived therefrom.

Patents Sealed.

[*From Gazette, November 21st*, 1862.]

November 21st.

1509. J. Eastwood.
1541. J. H. Perry.
1543. G. Crawford.
1559. J. Ward and J. Dewick.
1569. M. Walls and J. Crompton.
1570. J. Taylor.
1585. J. Ireland.
1591. J. Duffus.
1614. G. Ashton.
1620. W. Clark.
1643. R. Shortrede.
1665. E. Lloyd.
1678. G. Peel and J. Simpson.
1760. C. A. Tyler.

[*From Gazette, November 25th*, 1862.]

November 25th.

1595. H. Eaton,
1597. J. H. Kidd.
1600. C. Cohen.
1602. R. Martindale.
1603. T. Turner.
1605. J. Hirst, jun., and E. O. Taylor.
1606. R. A. Brooman.
1611. J. Hirst, jun., and J. Wood.
1617. C. D. Abel.
1619. J. Paterson.
1621. N. Lawton and R. P. Whitrworth.
1634. W. Eddington, jun.
1637. A. Gilbey.
1639. G. Ermen and R. Smith.
1640. W. T. Smallwood and W. Wright.
1641. A. Moreau and A. E. Ragon.
1654. B. Templar.
1662. C. E. Gray.
1722. A. J. Joyce.
1754. M. Jackson.
1787. J. Hunt.
1820. D. Adamson and L. Leigh.
2062. A. Cotelle.
2431. J. B. Thompson.
2432. Sir W. O. Brooke.
2506. W. Richards.
2565. W. Glass.
2582. L. Dixey and G. Smith.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, Novembert 25h*, 1862.]

November 18th.

2624. J. Petrie, jun.
2646. R. Mushet.
2680. T. Watson and G. Healey.

November 19th.

2757. F. Coignet.

November 20th.

2645. C. G. Hill.
2666. W. Smith.

November 21st.

2668. T. Carr.

November 22nd.

2663. A. Hubart & V. Cantillon.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, November 25th*, 1862.]

November 19th.

2618. D. S. Price and E. C. Nicholson.
2619. D. S. Price and E. C. Nicholson.
2645. J. Jobson.
2659. F. Coignet.

November 20th.

2631. J. Roberts, jun.

November 21st.

2637. C. T. Dunlop.

November 22nd.

2653. C. Sanderson.
2664. J. Clark.
2687. R. A. Brooman.

Journal of the Society of Arts.

FRIDAY, DECEMBER 5, 1862.

NOTICE TO MEMBERS AND INSTITUTIONS.

Exhibition Catalogues.

Her Majesty's Commissioners for the International Exhibition of 1862 have placed at the disposal of the Council, for distribution to the Members of the Society and Members of the Institutions in Union, copies of the Industrial and Fine Art Catalogues.

Members of the Society desiring to have copies of each of these Catalogues may have them on application, either personally or by an authorised agent, at the Society's House.

Secretaries of Institutions in Union may have a limited number of copies placed at their disposal for distribution amongst their Members, on making a similar application.

General Index.

A general Index to the first ten volumes of the *Journal* will shortly be published, which may be bound with the last volume. Members who desire to have copies (which will be supplied *gratis*) are requested to apply to the Secretary as early as possible, in order that a sufficient number may be printed.

EXAMINATIONS, 1863. — NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The attention of Secretaries of Institutions and Local Educational Boards is specially called to the following extract from the programme of examinations for 1863:—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1863. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Whenever this is the case, the names and addresses of the members, both of District Board and of its Branch Boards must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

THIRD ORDINARY MEETING.

Wednesday, December 3, 1862.

The Third Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 3rd inst., Rear-Admiral Sir Edward Belcher in the chair.

The following candidates were proposed for election as members of the Society:—

Attenborough, Richard	Whitley Grove, Reading.
Aubin, Charles	Guardian Works, Great Hampton-street, Wolverhampton.
Baylis, W. H.	69 Judd-street, Brunswick-square, W.C.
Bickley, William	7 Ludgate-street, E.C.
Birnstingl, Louis	230 Regent-street, W.
Bowron, James	Tees Glass Works, Stockton-on-Tees.
Boyd, James	91 New Bond-street, W.
Bradshaw, William	Meadow Iron Works, Mansfield.
Brockwell, Frederic H.	79 & 80 Leather-lane, E.C.
Cochrane, Adam L.	Galashiels, N.B.
Dix, Thomas	10 Amwell-street, Claremont-square, E.C.
Ebrall, Samuel	Canonbury-house, Kingsland, Shropshire.
Fraser, Edward John	26 Craven-st., Strand, W.C.
Frederickson, Johan Frederick	27 Finchley-road, St. John's Wood, N.W.
Godfrey, Edmond	30, Brewer-st., Golden sq. W.
Green, James	35, Upper Thames-st., E.C.
Hack, Thomas	West Middlesex Waterworks, Hammersmith.
Hammer, George M.	44, Harrington-street, Hampstead-road, N.W.
Hook, Charles Townsend	Snodland, Kent.
Hudson, Alfred	Cranbrook.
Johnson, Jabez	Pennington Hall, near Manchester.
McLaren, David S.	13, Bute-st., Brompton, S.W.
Scarth, John	96, Westbourne-terrace, W.
Warne, Stannard	4, Bruton-street, Bond-st., W.
Warrington, Wm. jun.	35, Connaught-terrace, W.

The following Candidates were balloted for and duly elected members of the Society:—

Abbott, Maj.-Gen. Sir Frederick, C.B.	73, Inverness-terrace, Kensington-gardens, W.
Ackland, William	121, 122, and 123, Newgate-st., E.C.; and 19, Church-row, Newington Butts, S.
Ainsworth, Samuel	(James Carter and Co.), High Holborn, W.C.
Aldebert, Isaac	57, Long-acre, W.C.
Allan, Alexander	Locomotive Department, Scottish Central Railway, Perth.
Allan, John	2 and 3, St. Paul's Churchyard, E.C.
Allen, Henry	17, Percy-street, Bedford-square, W.C.
Andrew, Fred. Wm.	3, Neville-terrace, Queen's Elm, S.W.
Ashworth, Taylor	The Grove, Hanley, Staffordshire.
Atkinson, J. Beavington	Rosehill, Cotham-park, near Bristol.
Atkinson, Richard	31, College-green, Dublin.
Austin, James	8 and 9, Princes-street, Finsbury, E.C.
Baiss, William Arnold	Denmark-hill, S.
Baldock, William	Grove-cottage, Putney, S.W.
Barron, E. C.	The Lodge, Chingford, Essex.
Barron, W. J.	The Lodge, Chingford, Essex.
Barry, Dykes	4, Buckland-crescent, Belsize-park, St. John's-wood, N.W.
Barry, John George	Meriton's Wharf, S.E.
Barry, Sir Redmond	Carlton-gardens, Melbourne, Victoria.
Bedford, Francis	23, Rochester-road, Camden New-town, N.W.
Bell, Thomas	Broadway-house, Plaistow, E.

Benson, James William	33 and 34, Ludgate-hill, E.C.
Betts, Rev. Robert Wye	Lyndhurst-road, Peckham, S.
Bevan, Henry	St. Mary's-street, Shrewsbury.
Birrell, George	Dunfermline, N.B.
Bolckow, Henry	Marton-hall, Middlesbro'-on-Tees.
Booth, H. C.	Harrogate.
Borwick, George	21, Little Moorfields, E.C.
Bradbury, Thomas	Longroyde, Brighouse.
Bradbury, William	40, St. John's-park-villas, Haverstock-hill, N.W.
Brady, George	Winchelsea-lodge, near Ilford.
Brassey, Thomas, jun.	Beaufort, Battle, Sussex; and University Club, Suffolk-street, S.W.
Bretnall, T. D.	24, Huntley-street, Tottenham-court-road, W.C.
Brooks, S. A.	10, Northampton-square, E.C.
Broomhall, J.	Manor-st., Old Kent-rd., S.E.
Brothers, A.	14, St. Anne's-sq., Manchester.
Buchwald, Joseph Children	12, Old Quebec-street, W.
Burgoyne, Gen. Sir John Fox, Bt., G.C.B., F.R.S.	8, Glo'ster-gardens, Paddington, W.
Caslon, Henry William	22, Chiswell-street, E.C.
Clark, Gordon Wyatt	72, Great Tower-st., E.C.; & Chessington, Surrey, S.W.
Clarkson, Thos. Charles	56, Stamford-street, S.
Clarkson, Wm. Watts	Narborough-road, Leicester.
Coathupe, Captain H. B.	1, Abingdon-terrace, Kensington, W.
Cole, James Ferguson	11, Great James-street, Bedford-row, W.C.
Collins, Hyman Henry	61, Torrington-square, W.C.
Cooper, Miss Adeline M.	78, Coleshill-street, Eaton-square, S.W.
Cooper, William	40, Brompton-row, S.W.
Cope, Walter	17, Terrace, Camberwell, S.
Cowan, Thomas William	Kent Iron Works, Bridge-street, Greenwich, S.E.
Curzon, Hon. Robert	24, Arlington-street, S.W.
Dawson, A.	Kingston-on-Thames, S.W.
De la Grangerie, Chevalier Dardenne	Rue Chalot, 76, Paris.
De L'Isle, Lord	Penshurst, Kent; and Ingleby Manor, Northallerton, Yorkshire.
Denman, Lord	28, Sackville-street, W.; and Middleton, Sheffield.
Dickes, William	Clarendon-villas, Loughborough-park, Brixton, S.
Dobson, Christopher Terry	13, Foxley-road, North Brixton, S.
Doubleday, H.	Coggeshall.
Dowleans, A. M.	Malvern-villa, Eldon-road, Victoria-road, Kensington, W.
Duncan, Charles Stewart	39, Inverness-road, Bayswater
Duncum, Chas.	17, Wigmore-street, W.
Dunville, William	Richmond-lodge, Belfast.
Earp, Thomas	1, Kennington-road (near Female Orphan Asylum), Lambeth, S.
Eastham, John	Moorfield-villa, Halifax.
Eddy, C. W.	8, Warwick-terrace, Belgrave-road, S.W.
Edmunds, Thomas Herbert	29, St. George's-square, Regent's-park, N.W.
Edwards, Richard	Dale-hall, Burslem, Staffordshire.
Ellis, Charles	21, Bedford-street, Covent-garden, W.C.
Ernst, F. Gustav	19, Calthorpe-street, W.C.
Evrard, Jean	35, Charles-street, Middlesex Hospital, W.
Falcke, David	Sutherland-house, Great Yarmouth.
Fetherston, John J.	18, Suffolk-street, Dublin.
Fryer, Henry	1 and 2, Gray's-inn-place, Gray's-inn, W.C.
Foley, Lord	26, Grosvenor-square, W.; and Worksop Manor, Nottinghamshire.
Forster, John	Denmark-hill, S.
Forsyth, James	8, Edward-street, Hampstead-road, N.W.
Foveaux, Joseph Franz	62, Strand, W.C.
Geeves, William	Caledonian Sawing and Planing Mills, New Wharf-road, Caledonian-road, N.
George, Francis	5, Sise-lane, E.C.
Ghislin, Thomas Goulston	72, Hatton-garden, E.C.
Gisborne, F. N.	3, Adelaide-place, London-bridge, E.C.
Goding, Charles	13, St. George's-place, Hyde-park-corner, S.W.
Goding, William	13, St. George's-place, Hyde-park-corner, S.W.
Gonzaga, H. S. H. the Prince of, and Duke of Mantua	11, Charles-street, Manchester-square, W.
Goodall, Josiah	12, Great College-street, Camden-town, N.W.
Grant, George	National Boat-building Company, 123, Fenchurch-st., E.C.
Gresley, Sir Thomas, Bart.	Cauldwell-hall, Burton-on-Trent.
Guillaume, Charles	16, Myddelton-square, E.C.
Hall, Charles Godfrey	89, Quadrant, Regent-street, W.
Hamilton, Capt. Henry George, R.N.	71, Eccleston-square, S.W.
Hancock, Henry	37, Harley-street, W.
Harnett, William	12, Panton-square, Coventry-street, W.
Harvest, D.	Dowgate Dock, Upper Thames-street, E.C.
Harvey, Alexander	Govanhaugh, Glasgow, N.B.
Headland, Edward	6, Upper Portland-place, W.
Heath, Robert	25, St. George's-place, Hyde-park corner, S.W.
Heathorn, Captain Thos. Bridge	Royal Artillery Barracks, Sheerness.
Herdman, William G.	West Villa, Everton, Liverpool.
Heywood, Edwin	Halifax.
Higgs, Samuel, jun.	Penzance.
Hill, Lord A. Edwin, M.P.	24, Belgrave-square, S.W.
Hodgkinson, Francis O.	161, New Bond-street, W.
Honeyman, Rev. D., F.G.S.	Nova Scotia.
Horwood, H. J.	36, Albert-street, Regent's park, N.W.
Howard, Thomas	King and Queen Iron Works, Rotherhithe, S.E.
Hutchins, William	8, Croom's-hill, Greenwich, S.E.
Jackson, Samuel	Bradford.
Jecks, Isaac	Great Yarmouth.
Jeffrey, John	61, Charlotte-street, Portland-place, W.
Johnson, Colonel B. P.	Corresponding Secretary, New York State Agricultural Society, Albany, New York, U.S. America.
Johnston, James	Newmill, Elgin, N.B.
Keeling, Herbert Howard	King and Queen Iron Works, Rotherhithe, S.E.
Kershaw, William	Suffolk-lodge, Brixton-road, S.; and 16, St. Mary Axe, E.C.

Key, John	White Bank Engine Works, Kirkcaldy, N.B.
Kindon, Charles	Swan-street, Old Kent-road, S.E.
Knott, J. H.	Prospect-cottages, Roehampton, S.W.
Kullberg, Victor	12, Cloudesley-terrace, Islington, N.
Land, John	94, Cannon-street, E.C.
Langdale, E. F.	72, Hatton-garden, E.C.
Lazard, Edward	46, Gloucester-crescent, Hyde-park, W.; and 11, Moorgate-street, E.C.
Lea, Charles James	High-street, Lutterworth.
Leak, Abraham	132, Piccadilly, W.
Legg, Thomas Rowland	11, Croom's-hill, Greenwich, S.E.
Lenthall, Henry	222, Regent-street, W.
Letchford, R.	Three Colts-lane, Bethnal-green, N.E.
Lillicrapp, W. P.	19A, Davies-street, Berkeley-square, W.
Litchfield, Samuel	19, Green-street, Leicester-square, W.C.
Longbottom, John, Jun.	Osmondthorpe-hall, Leeds.
Lovegrove, James, C.E.	Pembury-lodge, Dalston-rise, N.E.
Lutley, James	Queen's-road, Brighton.
Maclean, T. M.	26, Haymarket, S.W.
Mann, Aldridge	122, Holborn-hill, E.C.
Marsden, W. J.	Upper Thorpe-road, Sheffield.
Martin, Thomas	22, Stock Orchard-villas, Caledonian-road, N.
Martin, W. A., C.E.	55, Great Sutton-street, E.C.
May, Harry	9, Gloucester-grove West, Brompton, S.W.
McCallum, D.	1, Octagon, Union-road, Plymouth.
McClure, Andrew	Walbrook, E.C.; & 14, Ladbroke-sq., Notting-hill, W.
McLennan, J.	6, Park-place, Highbury, N.
Miller, John	Sandland's Chemical Works, Aberdeen.
Moffat, Major A. Hay	65, Porchester-terrace, W.
Molineux, Thomas	37, John Dalton street, Manchester
Morewood, Edmund	Stratford, E.
Newth, Frederick	44, Percival street, Clerkenwell, E.C.
Nicholls, Henry	52, Regent-street, W.
Northcott, Edward	13, Rood-lane, E.C.
Odling, Anselm	6, Prince's place, Kennington-road, S.
Oram, George	19, Wilmington-square, E.C.
Ormson, Henry	Stanley-bridge, King's-road West, S.W.
Oswald, Alexander Haldam	58, Green-street, Grosvenor-square, W.
Paine, Mrs.	Farnham.
Parkhurst, Rodie	7, Clarendon-terrace, Lewisham-road, S.E.
Partridge, Ebenezer	Whinfield Works, Smethwick.
Philp, Andrew Bell	10, Paradise-row, Stoke Newington, N.
Pooley, Henry, C.E.	Albion Foundry, Liverpool.
Power, Bonamy	19, Chesham-street, S.W.
Powis, Earl of, D.C.L.	45, Berkeley-square, W.; and Powis Castle, Welchpool.
Pugh, Edward	Bilston.
Pulham, James	Broxbourne, Herts.
Purling, Charles	150, Marylebone-road, N.W.
Ranwell, John Percival	1, Middleton-place, Stoke Newington-road, N.
Reed, William	5, Sumner-place, Onslow-square, S.W.
Revell, James	267 & 272, Oxford-street, W.
Ridley, Arthur S.	54, Gloucester-road, Regent's-park, N.W.
Robertson, Archibald	67, Gracechurch-street, E.C.
Robinson, John	Rochdale.
Rosher, F.	72, Mornington-road, Regent's park, N.W.
Rosher, George	54, Oakley-square, N.W.
Roupell, Robt. P., Q.C.	13, Park-lane, Piccadilly, W.
Rumsey, W. S.	Derby-house, Clapham-rise, S.
Russell, Captain Godfrey	103, Albany-street, Regent's-park, N.W.
Russell, John	Risca-house, near Newport, Monmouthshire.
St. George, Brigadier-General, J.	17, Rutland-gate, S.W.
Sambrooke, Thomas	32, Eaton-place, S.W.
Samuelson, Martin	Scott-street Foundry, Hull.
Sax, Julius	8, Hatton-garden, E.C.
Schooling, Henry	2, Parkfield-villas, King Edward-road, Hackney, N.E.
Scudamore, Frank Ives	Conduit-vale House, Blackheath, S.E.
Seaton, W.	44, Albemarle-street, W.
Sharman, Alfred	Mulberry-villa, Walham-green, W.
Skinner, H.	25, Coleman-street, E.C.
Smith, Henry	21, Duke-street, Edinburgh.
Smith, Robert	23, Fish-street-hill, E.C.
Spink, Daniel	Pyleigh, Bridgewater
Stanley, W. F.	3 & 5, Great Turnstile, Holborn, W.C.
Stevens, John Robert	8, Delamere-terrace, Maida-hill, W.
Stodart, Mrs. Matilda	31, Cloudesley-terrace, Islington, N.
Stubbs, William	10, Elliott-street, Liverpool.
Sutton, Martin Hope, F.R.H.S.	Cintra-lodge, Reading.
Thompson, Joseph	Beach-grove, Bowden.
Thompson, Nathan	National Boat-building Company, 123, Fenchurch-st., E.C.
Truscott, Francis Wyatt	5, Suffolk-lane, Cannon-st., E.C.
Tueski Moritz Paul	King's Lynn, Norfolk.
Turner, W. Shearman	55, Old Broad-street, E.C.
Turney, J. G.	Shirley-villa, South Norwood, S.
Twelvetrees, Harper	Bromley, Middlesex, E.
Tyler, James W.	4, Wood street, Westminster, S.W.
Ullmer, Frederick	15, Old Bailey, E.C.
Usher, Rufus	Bodicott, Banbury.
Vickers, James	Woodlands, Tooting Common, S.
Vines, Richard	3, Great College-street, Camden Town, N.W.
Vogan, James	Mill Wharf, Mill-street, Bermondsey, S.E.
Ward, William A.	3, Belgrave-villas, Barrington road, Brixton, S.
Watney, James, Jun.	10, Oxford-square, W.
Watts, Henry	31, Wellington-road, Stoke Newington, N.
Welton, Thomas	13, Grafton-street, Fitzroy-square, W.
Wesley, Matthias Erasmus	36, Great George-street, S.W.
Westley, Frederick Wm.	10, Friar-street, Doctor's-commons, E.C.
White, Frederick Meadows	5, Brick court, Temple, E.C.
White, George	Abbey-street Schools, N.E.
Whitehead, William	203, Western Bank, Sheffield.
Whitelaw, John	St. Clement's Wells, Musselburgh, N.B.
Whitmee, John, Jun.	70, St. John-street, E.C.

Widnell, Henry . .	Lasswade, near Edinburgh.
Wilford, John . .	Brompton, near Northallerton, Yorkshire.
Williams, W. E. . .	High-st., Wandsworth, S.W.
Wilson, Isaac Whitwell .	Castle-lodge, Kendal.
Wilson, William . .	Fairbank-villa, Talfourd-road, Camberwell, S.
Young, William Martin .	Warwick-crescent, Harrow-road, W.
Zaehnsdorf, Joseph .	30, Brydges-street, Covent garden, W. C.

AND AS HONORARY CORRESPONDING MEMBERS.

Altgelt, Regierungs-Rath A.	Prussian Commissioner for the International Exhibition of 1862.
Beeg, Dr. C. . . .	Bavarian do.
D'Azeglio, His Excellency the Marquis. . .	Ambassador for Italy.
Del Campo, J. M. . .	Secretary of the Dutch Commission for the International Exhibition of 1862.
Devincenzi, Commendatore G., M.P. . .	Italian Commissioner for do.
Di Cavour, Marchese G. B., M.P. . .	Do do. do.
Dietz, Dr.	Commissioner from Baden for do.
Fortamps, Senator F. .	Belgian Commissioner do.
Hoene, Geheimer-Ober-Regierungs-Rath . .	Prussian do.
Karmarsch, Dr. C. . .	Hanoverian do.
Koch, Herr . .	Secretary of Ministry of Commerce, Berlin.
Peterson, George . .	Russian Commissioner for the International Exhibition of 1862.
Sannicola, Le Chevalier Docteur Giovanni .	Naples.
Tidemand, Emil . .	Norwegian Commissioner for the International Exhibition of 1862.
Villa Maior, Le Visct. de	Portuguese do.
Von Steinbeis, Dr. . .	Commissioner for Wurtemberg for do.
Waern, C. F. . . .	Swedish Commissioner for do.
Wiessner, Regierungs-Rath M. L.	Saxon do.

The following Institution has been received into Union since the last announcement:—

Redhill, Town-hall Literary and Scientific Institution.

The Paper read was—

ON BOAT-BUILDING BY MACHINERY.

By D. PUSELEY.

If, instead of being at the meeting of a scientific Society, you had just taken your seats at a well-furnished dinner-table, the momentary attention attracted by the servants while uncovering the repast, would be at once eclipsed by the attraction of the repast itself. Be it so on the present occasion. I am simply a waiter or attendant at the scientific entertainment to which you have been invited. And while I shall endeavour, to the best of my ability, to place the fare before you in a lucid but unadorned manner, the only thing I could desire to win from you in return would be the simple assurance that, instead of attempting anything beyond my own humble capacity, I have—like a modest waiter—confined myself to the duties of my situation.

Although indisposition has for some time past prevented me from appearing on a public platform, I have this evening undertaken to introduce a subject which might not otherwise have been brought before this Society. The parent of the invention on which the theme is founded declares that he could not speak of his own work unless you were at his factory, and that if you were there he would have no occasion to speak, inasmuch as his machines would speak for themselves. But at the close of my addresss, I will, should you desire it, furnish you with a key by which you may discover that, if my friend cannot speak boldly, he can at least speak as much to the purpose as anybody else.

My own task this evening is an easy one. I have no longer to dwell on the difficulties in the way of the inventor, and those who assisted him, in introducing his invention to the public. Beyond the inventor and myself no human being will ever know the extent of those trials. But I have simply to speak of what is now, so far as public recognition is concerned, an accomplished fact. And though it will be impossible to convey to you more than a faint idea of the wonderful power of Mr. Thompson's machines, a few words on the subject may induce some of you to visit the factory and judge for yourselves. Sceptical gentlemen (if there are any) may then become converts, like the Lords of the Admiralty, one of whom, at the close of the mechanical exposition, exclaimed, "I believe machinery capable of anything but diplomacy."

If, then, the new system for boat-building by machinery is a mechanical novelty of public interest, it must be doubly interesting at the present moment, inasmuch as the system itself, which has hitherto only received a partial or sectional illustration by a few skilful workmen, is on the eve of being worked in its entirety by a full and (what time and practice, it is to be hoped, may make) an efficient staff. Anything is of course a theory that has not received a practical solution. The new system for boat-building by machinery is about to be put on its trial. The National Company—by whom the patents for this country have been secured—will shortly have in full, in not in perfect operation, the entire series of machines to which, by the aid of models and specimen. of manufacture, I am now going to direct your attentions Although I have not the honour to be, in any way, connected with the Company in question, I may venture to repeat (what has often been predicted by some of the most eminent scientific men of the day) that the said Company, by the introduction of machinery into an important branch of naval architecture, will furnish another striking proof that the slow process of manufacture by manual labour is no match for steam-power and the scientific improvements of the nineteenth century. And, so far as the present subject is concerned, the assumption is materially strengthened by the fact that two of the most extensive and eminent boat-builders of the day—the Messrs. Forrestt—are managers to the company by whom boats built by machinery are about to be introduced to the world at large.

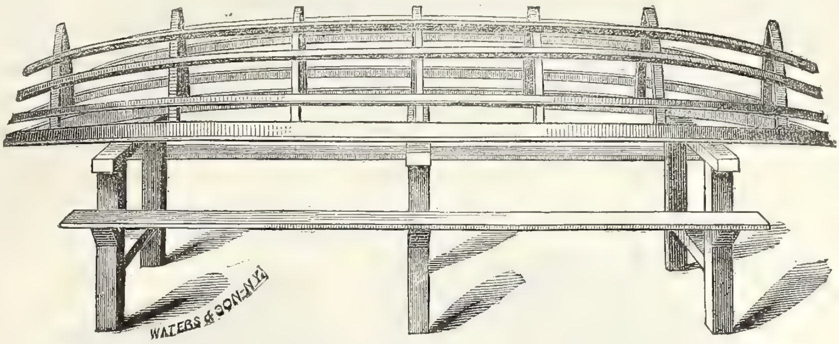
The splendid fleet of boats that have been built for one of the first and most philanthropic Societies in the kingdom—I mean the Royal National Life Boat Institution—prove at least that the Messrs. Forrestt were first-class boat builders under the old system. But, finding that they could not compete with machinery, these gentlemen are now the captains or pioneers by whom the new system is to be introduced.

As Mr. Thompson, the inventor of this system, is himself present, together with many other gentlemen who are better qualified to discuss this subject than one who has no pretension to mechanical skill, I will, as a simple preface to discussion, inquiry, and explanation, proceed to illustrate, as briefly as possible, the various sections of the invention by the combination of which the grand result is accomplished.

Here is the model of an Assembling Form (Fig. 1, see next page):—

Assembling forms, like boats, are of various shapes and sizes. Like the foundation of any other structure, the assembling form in the new system of

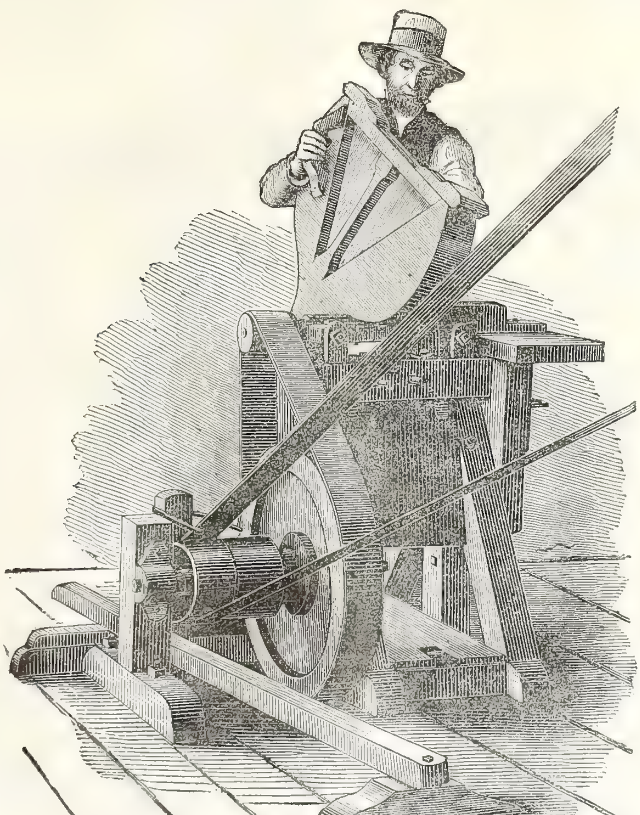
Fig. 1.



boat building is the groundwork on which the entire superstructure is raised. While the machines are the mechanical workmen by which all parts of a boat are cut to pattern, or regulated by index to the exact size required, each part fits with the same mechanical accuracy in its allotted space on the assembling form. Every part bears a number or mark that finds a corresponding number or mark on the form. And it is in the great sub-division of labour, by which all parts of a boat are manufactured simultaneously, that the anticipated saving in time and expense will be effected. This sub-division of labour will also apply to the adjustment on the form of the various parts of a boat. And this is the only feature under the new system that requires the exclusive application of manual labour. Although Mr. Thompson has invented or adapted machines for the manufacture of every part of a boat, he has not yet invented a machine for putting those parts together. The final operation must still be performed by those mortal guides without which machinery itself would become a stagnant power.

To an entire stranger who has neither seen the new process in operation nor heard any explanation thereon, there may appear something almost incomprehensible even in the announcement of "boat building by machinery."

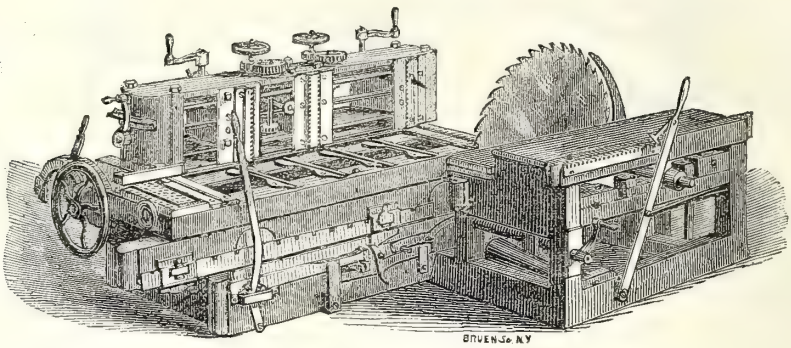
Fig. 2.



So romantic does the thing appear to a stranger, that on one occasion a certain gentleman, one of the Lord Dundreary type, on his way to Mr. Thompson's factory, wanted to know "whether a log of wood, after passing through a machine, would reappear on the stage as a ready-made boat?" Mr. Thompson's inventions are not of such a "sensational" character as that, although, by his new process of boat building, he turns everything upside down.

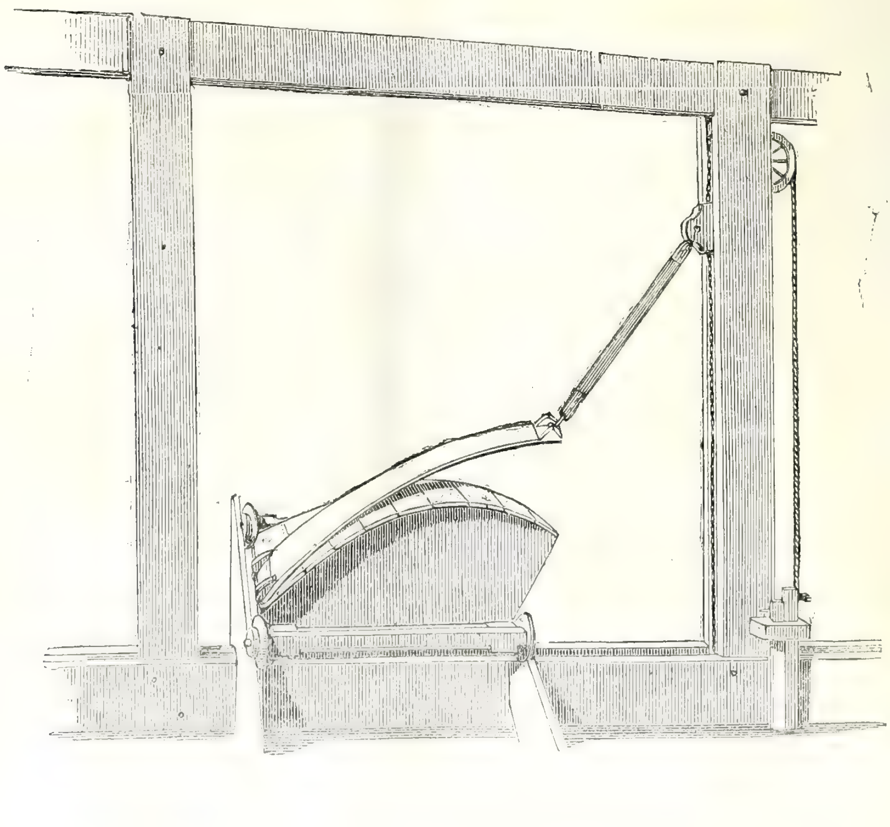
But before I refer to the machines by which the component parts of a boat are shaped, let me direct your attention for a few moments to the magical performances of a little outsider. Though a grating or trellis-work foot board does not form an integral part of a boat, it is nevertheless a necessary appendage. On the table is the model of a little circular cutter, or—as some call it—a "drunken saw." Yet, even in its unsteady movements, it will accomplish in a few minutes what, by the old system, would occupy one

Fig. 3.



of the most sober of workmen at least half a day. This saw has a lateral as well as a longitudinal set of teeth. By the aid of a small screw lever it is forced from its perpendicular position, according to the width of the cutting that may be required. The irregular or oscillating motion thus produced, when it is revolving rapidly, multiplies the teeth, as it were, till they become a surface cutter or circular plough, that clears everything before it. A counterfeit operation may serve to illustrate the process. Let us suppose that above the surface of the table before which

Fig. 4.



I now stand, this little saw shows its teeth to the depth of the tunnels required in the wood that is to pass over it. Placed on a mechanical guide, the plank is thus conducted over the saw by the workman. The result of this operation would be a number of gashes partly through the wood. In another minute the plank has been cut into strips or bars like those on the table. After going through a planing machine (see Fig. 2, p. 55), the bars have only to be crossed on the openings prepared for their jointure, and this produces the grating, a specimen of which is now before you.

I will now refer to a few of the leading machines. And, in this brief reference, I will simply place before you the result of what each is destined to accomplish. A lengthened dissertation on the mechanical peculiarities of such machines does not come within the province of a literary man, unless he were at the same time a scientific man. I will, therefore, at the close of my brief discourse, leave Mr. Thompson to answer any inquiries that may be made by the scientific gentlemen whom I have now the honour to address.

To describe in detail each of the curiously contrived appliances by which the great end is obtained would require more time and a larger amount of mechanical knowledge than I have at command; and a minute description of these machines would afford you but a faint idea of the powerful combination of tools—propelled by steam—which tend to form, as if by magic, superb pieces of naval architecture. The practical value of the invention, or number of inventions, lies in the beautiful simplicity and converging unity of the whole. It is a "system" that must be viewed in its entirety. To regard it in any other way would be like taking a sketch of a majestic human form, minus a leg or an arm. It is a system the operation of which must be seen to be thoroughly appreciated. The most elaborate description would fail to convey a correct idea of the power, beauty, and simplicity of the machinery to those who have never seen it in motion. Writers may enlarge on the wonders of an invention that shapes huge pieces of wood into any form, but who—in the absence of occular demonstration—shall picture to the mind of others the beautiful combination of mechanical units by which a hundred or (by an increased staff) five hundred boats of any size can be made from the rough material in a few days? The *Times* says:—

"The whole machinery possesses the same superiority over hand labour that the power-loom has over the bygone system of knitting. It is the old story of a man working ten hours on wages against a machine that works day and night, and costs nothing but a little oil. Therefore, before long, all boats will be built by steam machinery."

Here we have the model of what is called a "combination saw" (Fig. 3, see preceding page), a saw for cutting a log of wood into planks. There is nothing very remarkable in the saw itself; but there is a combination of advantages in the mechanical contrivances by which the wood is propelled and cut into the various tapering shapes required by the boat builder.

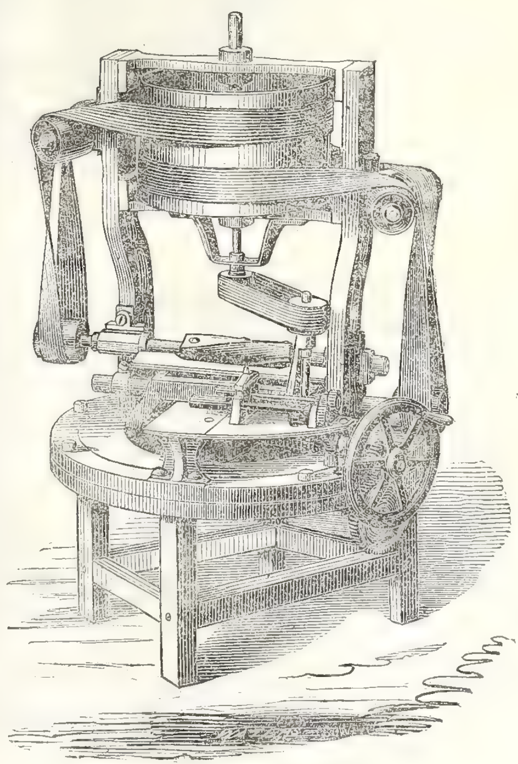
The next step in the system is to bend these planks into the required form. After they have been prepared for this operation by a steaming process, they are placed under a bending machine (of which here is a model, Fig. 4, see preceding page), and, by the aid of steam power, they are rounded to the form beneath with as much ease as a boy would bend a small cane across his knee. The woodcut represents the mode of operation, while on the blocks before you we have a couple of planks in their rounded shape. One represents the forward cant, and the other the midships of a boat. The rounded planks, after remaining for some time in a drying room, become as fixed and firm in their new, as they were in their original shape. They are then cut into ribs, and, after passing through a planing machine, they constitute the perfect ribs.

As a mechanical curiosity, there is probably not another machine in the entire series to be compared with that which gives to a plank its interior and exterior curve at the same moment. This machine is called a curvilinear cutter or plane. Mr. Thompson was many years before he brought this machine to its present state of perfection, and he worked as only an enthusiastic inventor can work. With the exception of as noble a "trio" of American gentlemen as ever took a countryman by the hand, the only comfort or assistance the mechanical workman received from others was in the friendly assurance that he would never succeed. But the inventor happens to be one of those determined individuals who, for success in this life, would rather trust to number one than to any other number. All great inventors have had to do the same thing—otherwise the world would never have had a great invention.

On their passage through this machine, the planks required for a boat of any size obtain their interior and exterior curve at one and the same time. The workman or guide has simply to let the index on the machine correspond with the number on each plank; and the cutters or knives, being concave and convex, any degree of concavity or convexity that may be required is at once obtained.

The *Times*, in its notice of the invention, says that "such a machine, up to the present time, has been deemed a mechanical impossibility, and that the search for its discovery has been as futile as that for the philosopher's stone." So says the *Times*. Yet, in the rapid advances now made by scientific men, the *Times* itself can hardly keep pace with some of the "great guns" of the day. But, although Mr. Thompson has found this wonderful machine, and brought it all the way from America, some of you may be disposed to say—from what has taken place there since he left—that he has brought away the philosopher's stone also. However, here is a model of the machine, together with a specimen of manufacture. (See Fig. 5.) This will enable you to judge of the capabilities of the machinery itself.

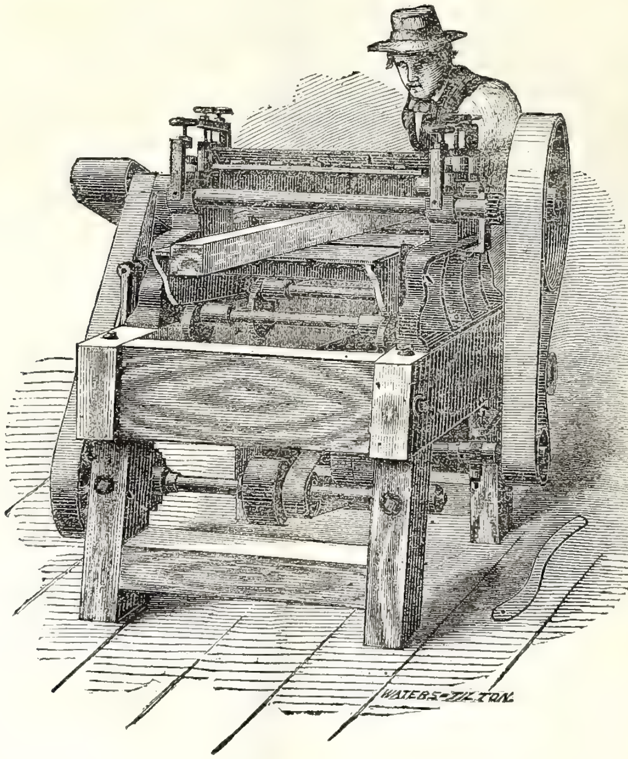
Fig. 5.



To enable those who read this paper to understand it—as well as those who hear it read—it may be necessary not only to offer a few more explanations concerning the machines that are used in the manufacture of the various parts of a boat, but also to furnish one or two more illustrations in order to show the system after every part has been shaped by such machines, and is ready for its final adjustment. With regard to the machines, it is impossible to convey a correct idea to others, or for others to form a correct idea of their mechanical peculiarities machines, by a critical and personal examination. While there are nearly twenty machines used in the manufacture of the various parts of a boat (all in operation at the same time), and while the functions of each machine are of a distinctive character, it would take a good-sized octavo volume to enter fully into the particular properties of the entire series. To be fully comprehended, the system must not only be studied in its entirety, but witnessed in operation.

In addition to the cutters previously referred to, here is an elliptic knife, or diagonal cutter. (Fig. 6.)

Fig. 6.



All that can be said (to be understood) is, that the machine consists of a rotating knife, with an adjusting guide, enabling a clean cut to be made on the edge of any plank or block of wood, from a square to an angle or bevel of 45°, according to the inclination given. The illustration represents a workman in the act of giving the required bevel to a stern-board. This machine, at the lowest computation, will perform the work of a dozen men working under the old system.

As I have previously stated, every boat built by the new process is built on an assembling form. In the naval and mercantile marine there are (together) about 30 standard sizes, shapes, or classes of boats, and forms to that number will always be kept on hand, while for any person who might require a boat or a number of boats differing from either of these shapes, an alteration, addition, or, if necessary, a new form can be made.

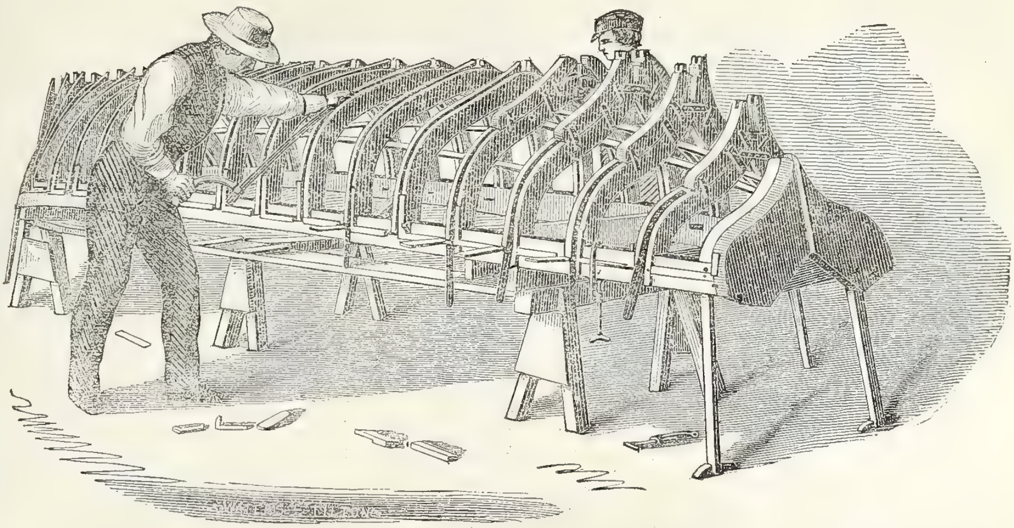
Fig. 7 shows the process of putting the frames on the assembling form, when such forms are ready for adjustment.

And Fig. 8 illustrates the mode of planking, which is the final operation, previously to the boat being hoisted from the form on which it has been built.

There is one point to which I have not before referred. Next in importance to the power of being able to supply the extended demand that must arise in the boat-building trade, through the increased facilities for supply, is that system, or process, in Mr. Thompson's invention which enables the inventor to furnish with each and every boat a duplicate part, or duplicate parts, thereof. By such duplicate parts, any damage a boat may sustain can be at once repaired, without the delay, trouble, and expense either of sending it to a boat-builder, or having it patched up by incompetent hands and insecure means. Further than this—accidents to the boat or boats of a ship often occur at times and places in which boat-builders or carpenters may not be within reach; often, too, when, if such aid could be immediately procured, the service required could not be rendered in the brief space that would make it of any use. This want will in future be supplied, and the countless, and sometimes fatal, inconveniences that have hitherto arisen, will be entirely obviated in Mr. Thompson's system, by which the duplicate parts of a boat can be easily fixed.

It would only be a waste of your time if I were to say anything about the time that will be saved in boat-build

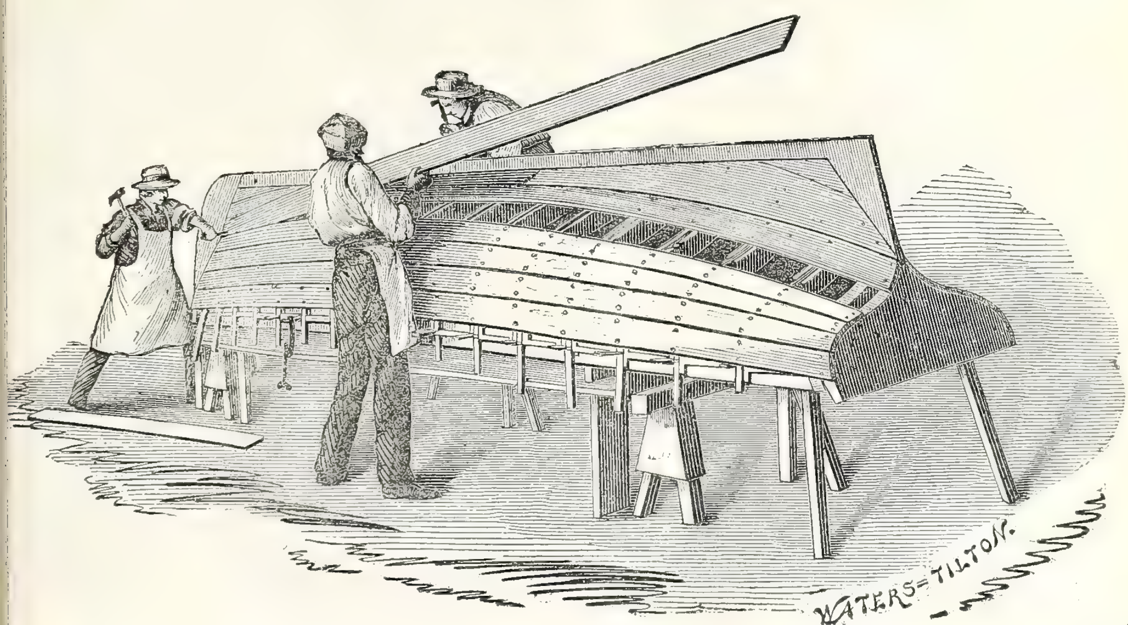
FIG. 7.



ing under the new system. The advantages of steam-power are so well known at the present day, that anything beyond a mere allusion to the subject would be like telling an Englishman that the railway will now take him from one end of the kingdom to the other a little more expeditiously than the old stage-coach.

From the first day on which Mr. Thompson's invention was seen in England, and as the first Englishman who saw it, I have watched with some anxiety—not the difficulties that had to be overcome by the invention (there were none), but the difficulties that were found on the slippery steep and rugged path that led to its final adoption. Happily these troubles have all faded away, and I will close this introductory address by recording my humble testimony (and I am sure I do so with the hearty concurrence of the inventor) to the skill and assiduity displayed, not only by the inventor's brother (Mr. John Thompson), but also by his two superintendents, Mr. John Green and Mr. William Vyse. Although they have not invented the new system for boat-building, they have been the vital instruments by which the invention itself has been practically demonstrated. Whatever external assistance may have been rendered by others, these practical mechanics have worked like slaves within the factory; and as we are all advocates for the abolition of slavery (although we have been very quiet on that subject lately) you will be glad to learn that the gentlemen alluded to may now return

FIG. 8.



to their own country as free and, I trust, independent men.

In thanking you for the attention with which you have listened to my address, I will leave any further discussion on the subject to more competent persons, namely—to the inventor and the scientific gentlemen by whom he is surrounded.

DISCUSSION.

Mr. Thompson (having been introduced to the notice of the meeting by Mr. Puseley) begged, on behalf of himself and those associated with him, to return his thanks to that gentleman for the way in which he had brought forward the subject. It was, he said, one thing to invent, and another thing to be able properly to describe the invention; he must, therefore, leave it to speak for itself. It was impossible to give any detailed explanation of the various machines, the models of which were before them, further than had been done by Mr. Puseley, and it was necessary to see them in operation properly to understand them.

Mr. Green having pointed out the description of work which the several machines were designed to execute,

A Member inquired how many separate machines were required to prepare all the materials for a boat.

Mr. Thompson replied, seventeen. It was further explained that the machinery now erected at the company's works at East Greenwich was adapted for any boat, from the smallest size up to 32 or 40 feet in length. The steam-power employed consisted of two engines of 40 horse-power each. The only operation left to be performed by manual labour was the putting of the various parts of the boat together on the "assembling form," after they had been prepared by the machinery.

Mr. Peter Graham said, having seen the machinery in operation, he could entertain no doubt of its efficiency as a substitute for manual labour in the preparation of all the parts required for the construction of a boat. The saving effected was in the labour, because the material was the same whether prepared by manual labour or by machinery. Mr. Turner, master shipwright at the Royal Dockyard, Woolwich, had expressed his opinion that the saving in labour effected by this machinery might be represented by the ratio of seven to thirty-two, or, in other words, that the cost by machinery was less than one-fourth that by manual labour. That, he thought, was a fact of great interest to the commercial community, who might expect to be supplied with boats at a much cheaper rate than heretofore. At the same time, the company by whom the patent rights of the inventor had been secured in this country, expected to realise a fair return for the capital invested. In reply to an inquiry as to how long it took to put a boat together after the material had been prepared, Mr. Graham said that depended upon the number of men employed on the work; but he believed it could done in from five to ten hours, according to the number of hands employed and the size of the boat. The great advantage consisted in the facility afforded by this machinery of making an unlimited number of fac-similes of each particular part of a boat, so that duplicates of parts likely to be injured, might be supplied and fitted by unskilled hands in any part of the world. That was important in the case of ships at foreign stations, where there was a difficulty in getting boats repaired. He quite agreed with Mr. Thompson, that in order properly to appreciate this machinery it should be seen in operation; and he might state that as soon as the works were started, which would be in the course of a very few weeks, those who were interested in the subject would be admitted, under proper regulations, to witness the operations.

Mr. Brooks wished to be informed whether Mr. Thompson claimed to be the inventor of that portion of the machinery which was termed the "drunken saw?" Having seen these models in the International Exhibition, he admired the principle upon which they were constructed, but he pointed out to the person in attendance as Mr. Thompson's representative, that there was no originality whatever in the saw described, inasmuch as the drunken saw had been in operation in his own works for the last nine years, and had produced work of greater excellence than the specimens he saw at the Exhibition. Nine years ago one of his workmen invented this arrangement of the saw, and it was a curious coincidence that the term "drunken saw" should then have been applied to it, and repeated in the present instance. He should be glad to be informed whether the idea as to the originality of the invention came across the mind of Mr. Thompson when he took out his patent in 1860. It was not his (Mr. Brooks's) intention to discuss the details of these seventeen various machines. Many of them showed great skill in their design, and were doubtless original, but the question for discussion was not the quality of the workmanship, but who was the rightful inventor of some of the machines of which there were models before them? With regard to a portion of them, at least, he thought they could not be claimed as of American origin; if they were, they must have existed in the brain of Mr. Thompson more than ten years ago. He should be happy to show Mr. Thompson, or any other gentleman, the "drunken saw" which he had had at work for the last nine years, and at the same time should feel great pleasure in availing himself of the invitation that had been given to inspect the works of the National Boat-building Company.

Mr. Thompson said, with regard to the drunken saw, he had laid no claim to its invention. It had been in use in the United States of America for at least forty years. All he claimed was the adaptation of that implement to its present purposes, and the peculiar arrangement for producing the oscillating motion given to the saw. The system of machinery in its entirety was what he laid claim to, and its adaptation to purposes to which it had never been previously applied.

Mr. Puseley said it was distinctly stated in the paper, that while some portions of the machinery were originated by Mr. Thompson, he had also adapted previous inventions to his purposes. He had never claimed to be the inventor of the drunken saw. As a whole, he had adapted this machinery for the purpose of preparing the material for boats in one-fourth of the time it could be accomplished by manual labour.

Mr. Turner (of Woolwich Dockyard) said about two years ago he inspected Mr. Thompson's machinery, and was much delighted with it. By its means, every portion of the material of a boat was taken in hand simultaneously, and prepared with a mathematical precision which it was impossible to effect by manual labour. In a boat built in this manner, every part of the structure was brought in contact, and fitted accurately. He was altogether delighted with the invention of Mr. Thompson, and wished him every success.

Mr. Thompson begged to ask Mr. Turner whether he had ever seen the same ends accomplished by similar means?

Mr. Turner replied that he had not.

In reply to an inquiry by Mr. Charles Clifford, as to the variety of form and size of boats which could be manufactured by the machinery set up by the company,

Mr. Peter Graham said they had at present twenty-six assembling forms, which were adapted to as many descriptions and sizes of boats. Any variation in the particular form of a boat would, of course, require a separate assembling form; and as these forms were somewhat expensive, it would not answer to make a form merely for half a dozen boats of a particular model. The forms already prepared, and the machinery set up, were adapted for boats up to thirty-two and perhaps forty feet in length, and fifty tons burthen. If a demand arose for a large number of boats of a particular size and model, the assembling form would be prepared; the machinery could be adjusted to every variety of size. The system was equally adapted

for cutters of extremely fine lines and boats of broad beam.

The Secretary said the machinery would fashion the materials for any form of boat that was demanded; but in order to put it together an assembling form must be prepared of the model required. If a form was made merely for one or two boats, of course these could not be built relatively so cheaply as a larger number of the same form; but the machinery was adapted for any lines that might be required.

Mr. Peter Graham added that the cost of the materials would be the same, whether prepared by manual labour or by machinery; but the labour in the preparation was reduced by machinery to about one-fifth that of hand labour.

Mr. Turner remarked that the great point of the invention was the rapidity of production. He believed Mr. Thompson could build a boat complete in five hours.

Sir Thomas Phillips said he thought they were discussing with too great minuteness the details of the invention. All that was intended to be done was to submit to the Society a series of machines whereby a boat might be built in a very short space of time. with a great economy of labour. To Mr. Thompson certainly belonged the merit of having produced a great many ingenious machines, which he had applied to the effecting of a particular object, and in that he apprehended the inventor had entirely succeeded. They had been assured by a gentleman holding an important position in the public service that he was satisfied that, by these means, a boat could be built in an exceedingly short space of time, which was a most important object to be secured. So far, then, there was neither doubt nor difficulty. Whether or not the system would be productive of any great amount of commercial gain, must depend upon its practical adaptation to the wants of the community. There could be no doubt if, instead of varying indefinitely the type of the boats, they could build boats of a certain capacity of tonnage, upon a particular plan, whereby they might produce a large number of the same type, the economy which was promised by this plan would be secured; but it was obvious that it would not answer the purpose of these gentlemen to take an order for a single boat of an exceptional form, inasmuch as the commercial results must depend upon the production of a large number of a given type. With regard to the question whether Mr. Thompson was the inventor of a particular machine or not, that was not a matter of any great interest to this meeting. The question was this—had Mr. Thompson adapted machinery—no matter by whom invented—and rendered it applicable to a new object, which had never before been accomplished by machinery? If he had done so they would regard him as a public benefactor; the invention was in itself a highly creditable thing to Mr. Thompson, who had no doubt devoted a considerable portion of his life to the production of this system, and if he succeeded in producing great commercial advantages, the public at large would have the benefit of them; but if he did not succeed, he (Mr. Phillips) was sure they would accord to him that sympathy to which all men who pioneered for the good of society were entitled.

The Chairman said that, after the numerous explanations that had been given, very little was left for him to say on the subject, but there were one or two points which occurred to him, having witnessed the whole of the operations, and being himself a practical man in these matters. All the materials for a boat might be cut out and prepared by this machinery for putting together. It then required skilled workmen to put the parts together. One point requiring consideration was, that the planking, being cut by machinery, they might fall into the error of its fitting too well, because it was necessary to caulk it, and if the boat were not built for caulking she would tear herself to pieces. The grating, of which they had seen a specimen, had been produced in a somewhat similar manner for nearly fifty years past, but not prepared precisely in the same way. It was produced by a series of teeth, on the periphery of a wheel, so placed as to come into action in succession, an arrangement similar to what was used in Woolwich Arsenal for planing gun carriages in 1810. It had been seen that if a boat was required of different form—whether leaner or broader—it was very easy to fit battens on the outside of the assembling form, so as to adapt it to the required shape. There was a great advantage attending the planking prepared by these means, namely, the cutting of the planks to fit the curves of the boat, without straining them to bring them into position. In point of fact, he believed his friend, Mr. Turner would say they were in the habit of putting too much stress on a boat, instead of adapting the planking to fit without straining. The rabbeting of the keel, stem and stern, by this process, was very complete, and no man could arrive by hand at the precision which this machinery produced. With regard to the question of duplicate parts, he was not quite disposed to fall into the views expressed. If they had duplicate parts to take with them they must have literally duplicate boats, but the real advantage was, that duplicates could be kept at foreign stations, where a captain of a ship might take the duplicates and either repair or build a new boat, or three disabled boats might perhaps build two complete ones. The parts prepared by this machinery might be likened to the component parts of a watch, which were made by machinery and sold to a manufacturer for a small sum, and he eventually finished them up to form a complete watch or even a chronometer. So in this case, with a slight finishing, these machine-prepared parts might produce a perfect boat. With regard to the question of the drunken saw not having been the invention of Mr. Thompson, that was not now before them. Mr. Thompson did not claim it, but if he had done so, it was a question of law, and the man who claimed the patent must make good his right if he could. Mr. Thompson had gone through the fire nobly, and he wished him every success; he was sure this Society would be very glad to thank him and Mr. Puseley for having brought this very interesting subject before them.

Thanks were then voted to Mr. Thompson and Mr. Puseley.

The Secretary announced that on Wednesday Evening next, the 10th inst., a Paper by Mr. John Taylor, jun., "On the Construction of Labourers' Cottages, and Sanitary Building Appliances," would be read. On this evening Major-General Tremenheere will preside.

ASSOCIATION FOR THE PREVENTION OF STEAM-BOILER EXPLOSIONS, MANCHESTER.

At the last ordinary monthly meeting of the Executive Committee of this Association, held on Tuesday, November 25th, William Fairbairn, Esq., C.E., F.R.S., in the chair, Mr. L. E. Fletcher, chief engineer, presented his monthly report, of which the following is an abstract:—

During the past month there have been examined 365 engines and 547 boilers. Of the latter 8 have been examined internally, 60 thoroughly, and 479 externally, in which the following defects have been found:—Fracture, 5 (1 dangerous); corrosion, 38 (3 dangerous); safety-valves out of order, 13; water gauges ditto, 31; pressure gauges ditto, 9; feed apparatus ditto, 6; blow-off cocks ditto, 47 (1 dangerous); fusible plugs ditto, 3; furnaces out of shape, 6 (2 dangerous); blistered plates, 3; deficiency of water, 1. Total, 162 (7 dangerous). Boilers without glass water gauges, 10; without pressure gauges, 2; without blow-off cocks, 38; without back pressure valves, 78.

An explosion has occurred this month to the boiler of a first-class passenger locomotive engine, by which three persons were killed and others injured. It was considered to be perfectly safe, had been on duty the previous day

and was being cleaned ready for work at the moment the explosion occurred.

It will be remembered that reference was made in the July, 1861, report, to another explosion of a locomotive boiler, which took place while the train was running; and since that time three others have occurred in addition to the one first alluded to, thus making five during that period with this class of boiler.

The cause of explosion in four of these cases proved to be thinning of the plates from internal corrosion. I have only had an opportunity of examining the plates of one of these exploded boilers, but from the official report, it appears that the corrosive action had developed itself in a very similar manner in each instance, which in the one personally examined was as follows:—The corrosion had eaten grooves or furrows parallel with and close to the edge of the overlaps of the plates, at some of the longitudinal seams of the rivets; the furrows being on the outer plates of the overlap, while the deepest one, and that from which the explosion had sprung, was situated nearly midway between the smoke-box and fire-box.

This furrowing action will be at once recognised by those who have been in the habit of observing the influence of wear upon the ordinary internally-fired double-flued boiler, in general use in Lancashire. In this boiler the furrow is found on the inner surface, both of the front and back-end plate, but more especially at the front, and lies close to the edge of the internal flue angle-iron, which it partially encircles; the furrow being deepest at the crown, and gradually dying out in about six or nine inches on each side. It is sometimes found in the root of the angle-iron itself; the choice of position between the plate and angle-iron, apparently depending upon their comparative power of resistance. When the plate of the furnace-tube is flanged, the furrow more frequently occurs at the springing of the flange than at the end-plate. Furrowing also is very commonly found at the transverse seams of rivets at the underside of boilers; the furrows in these cases being immediately at the edges of the overlaps, and most frequently on the external surface of the plates, but sometimes on the internal. This action is more severe in long boilers than in short ones, and at the middle of their length rather than at their ends. It is seldom, if ever, developed at the longitudinal seams of these boilers, except where leakage takes place, and is then found to be most severe when the objectionable plan of construction is adopted, of placing the seams of rivets in one continuous line from one end of the boiler to the other. Such are some of the manifestations of furrowing constantly met with in the boilers under the inspection of this Association, and it may be interesting to attempt to trace the cause.

Furrowing appears to be the result of corrosive and mechanical action combined. The mechanical action, such as an alternate buckling of the plates, strains and frets them, and thus renders them more susceptible to the influence of corrosion than the parts at rest. Where these furrows are internal, the corrosive element is furnished by the water, which is rarely, if ever, free from acidity; and when the furrows are fonnd externally in the flues, as explained above, the corrosion may perhaps be attributed to the influence of the gases.

The cause of the buckling action varies according to the position in which it occurs.

In the stationary boilers above referred to, when found in the front end plate, it may be ascribed to the alternate elongation of the internal flues, more especially at the furnace end; and, when at the bottom of the external shell, to the unequal expansion of the plates consequent upon the different strata of temperature in the water. The temperature of these strata varies with the distance from the bottom of the boiler, in proof of which it may be stated that it is frequently found that while the water is boiling on the surface, that at the bottom of the boiler will not scald the hand. Those boilers are most conducive to this inequality of temperature which have a defective circulation of water, are so set that the least heat from the fire passes beneath them, and fed with comparatively cold water introduced at the bottom. It will be readily seen how these varying temperatures induce unequal expansion of the plates, and thus put upon the seams of rivets most irregular and severe strains. In this way, it is thought that the buckling action is produced, which results in furrowing at the bottom of stationary boilers.

In locomotive boilers the buckling at the longitudinal seams, in the cylindrical portion of the shell, arises from their not being of true circular form in the vicinity of the overlaps. The tendency of the internal steam pressure is to correct this, and to induce a true circular form, and thus a cross strain which may be correctly termed a "girder strain," is put upon the plates at a short distance on each side of the line of rivets; from this a change of shape ensues, which constantly varies with the pressure of steam. The position of the furrows is found to be that of greatest elasticity, being midway between the fixed ends of the fire-box and smoke-box, just where this buckling action would have most play. It will at once be seen that the thicker the plates the greater the leverage of the girder action, and thus to thicken their edges is only to aggravate the evil. The true circular shape may be maintained, as far as appearance is concerned, by substituting a butt-strip for the overlap, but this, from its one-sidedness, will not prevent the girder action, and, indeed, tends to make two furrows instead of one. Were an inner as well as an outer butt-strip introduced, the parts would be in equilibrio, and the strain then passing through the centre of the plates, they would be subjected to their legitimate tensile strain only, and the buckling action in question set at rest.

But whatever expedients may be adopted to meet special cases, as one after another may force itself upon attention, some general precautionary measure appears to be needed to guard against the subtle influence of corrosion. It is often found, in a line of one hundred rivets, to attack ten and neglect the remainder; in an entire boiler, it will affect one or two plates and not the rest; and even in a series of boilers will select one in preference to the others. No doubt careful analysis might detect some predisposition in the metal, and thus account for these apparent anomalies, but the difficulty of foretelling the precise course of corrosion must be candidly acknowledged, and hence the necessity, as just stated, for the adoption of some sweeping precautionary measure, which will embrace every case without distinction.

The Association meets the difficulty with its own members by affording them the opportunity of having what is technically termed a "thorough examination" of each of their boilers once a year, when all the seams as well as the surfaces of the plates, both outer and inner, are examined throughout, provided that the boiler is suitably prepared for the inspection. The conviction of the importance of these examinations—which such explosions as the one under consideration serve to deepen—may explain the frequency with which reference is made to this subject. Indeed, the Association cannot hold itself responsible for the safety of any of the boilers under its charge, where the opportunity of making an annual "thorough examination" is withheld. In addition, it recommends to these members using multitubular boilers, that such an arrangement of tubes should be more generally adopted as will admit of a man's gaining access between them and the shell for the purpose of examination, while those should apply the hydraulic test annually, who are employing boilers which will not admit of complete examination.

From the experience derived from the boilers under the inspection of this Association, it certainly appears hazardous to allow locomotives to work, as is very usually done, for five or seven years, without a complete internal examination; and it therefore becomes most important, either that some searching test should be adopted that shall at all times ascertain the sufficiency of the boilers without removing the tubes, or else that their construction shall be so modified that the parts may be rendered ac-

cessible to complete examination. The occurrence of four explosions to locomotive boilers, from internal corrosion, within the last eighteen months, must show the necessity of taking this subject into serious consideration.

SETTING BOILERS.—Considerable difficulty is experienced in examining many boilers from the contracted area of the flues, some indeed are altogether inaccessible. Boiler setting appears to be left too much to the individual tastes of the bricklayer, and consequently, flues of every variety of proportion are met with. A sketch has been drawn up of the proportions most generally approved, and at an early opportunity a description will be given—which space does not now permit—for the assistance of those who are re-setting their old boilers or laying down new ones; meanwhile, a drawing lies at the office of the Association for the inspection of members.

Home Correspondence.

WORKMEN'S HALLS.

SIR,—Having a few days back read the enclosed in the "Morning Star," I acted on the permission of the last paragraph and obtained a very practical set of rules. It has since occurred to me that other members of our Society might like to avail themselves of the opportunity of getting hints. Yours, &c.,

GEORGE F. WILSON.

Price's Patent Candle Company (Limited), Belmont, Vauxhall.

TO THE EDITOR OF THE "STAR."

SIR,—The strong desire which exists to provide for working men places where they may spend their evenings innocently, induces me, as one of the committee of the Southampton Workmen's Halls, to beg a little space to set forth the advantages of such institutions.

We have now three halls successfully established in this town, two of which are situated in the very lowest and poorest districts. The first was opened in June last, and in spite of long summer evenings and the distrust which at first existed, we had upwards of 700 men, engaged in sixty-eight different trades, join us before we had been established two months. To enable them to judge for themselves the first hall was opened free; but before a month had elapsed the worki g men themselves convened a meeting, at which upwards of 200 attended, and they decided by an unanimous vote to support it by a penny per week subscription! This voluntary taxation shows how they appreciated the advantages offered; and as our numbers increased so rapidly it was necessary to open a second and third hall. It is a very gratifying sight to see 100 to 150 labouring men (the great mass of whom are entirely beyond the reach of Mechanics' Institutes or Athenæums) assembled together in their working clothes, and with as much order and decorum as in a West-end club, engaged in reading, or in the various games provided for their pleasure.

The first object of the committee has been to provide recreation; and believing that labouring men and mechanics require relaxation as much, or more, than the classes above them, various games, such as bagatelle, dominoes, draughts, travelling maps, fox and geese, spillicans, puzzles, &c., &c. (in fact, the games that we admit in our families), are freely encouraged. The bye-laws against betting, gambling, and improper words are strictly adhered to; and the self restraint and wholesome discipline exercised in this way alone is very important. They all seem contented, and learn to enjoy life without the stimulus of betting, drinking, or swearing.

The main secret of our success is that we let them alone. There is such an universal readiness the moment you catch hold of labouring men to subject them to a severe course of mental drilling and moral physicking that they even now can hardly believe they are at liberty to come and go when they please, and to read, talk, and play, or have a nap if they prefer it, without our wishing to "improve the opportunity" by dosing them with our favourite nostrums before we have gained their confidence either as benefactors or as mental doctors.

Smoking is allowed in the main halls only; and we have a library room, a writing room, where men can quietly write home to their friends, and a class room, in which those who can neither read nor write can be instructed. There is also a front shop for the sale of coffee, cocoa, &c., and as many as 170 half-pints of these beverages have been sold to members on a Saturday night. We close at a quarter-past ten p.m. except on Saturdays, when we keep open until eleven, in order that our members may not be tempted to squander their weekly earnings at the beershops on their way home.

We admit no lads under eighteen years, but we have two rooms at one of the halls specially for boys from fifteen to eighteen; and on Sundays the Scriptures are read aloud in the evening to 50 to 150 of the poorest class, many of whom are too ragged and too dirty, as well as too indifferent, to go elsewhere.

Weekly readings by gentlemen, interspersed with recitations and songs by the working men, are held at each hall every Wednesday, and are usually full to overflowing, as the members are specially invited to bring their wives and families on these occasions, that they may unitedly enjoy an evening's recreation. Each hall has an executive committee of working men, and we have a central committee of gentlemen of which Sir G. B. Pechell, Bart., is the president. We have also a trade register for men seeking employment, and it is proposed to open one or two benefit societies in connection with the institution.

The fear that we may "take men from their fireside" finds no echo in the hearts of the poor wives. The inducement to domestic husbands to spend an hour or two at the hall, in company with their fellow men, weighs as nothing compared with the benefits afforded to the large mass of married men whom it draws from more dangerous places. There is also a large proportion of unmarried men in every town who have no family hearth to go to; men who only rent a bedroom, or perhaps half a one, and have no place where they can sit with comfort after the day's work is over, and for whom the corner of the street or the public house tap room is the only place of rendezvous. It is too early yet to speak of results, but we have already most cheering cases, in which poor women have called purposely to express "the good the hall has done them." "I havn't been so happy for years," said one; "my husband comes home sober and good-humoured, and brings his money too."

The intermingling of all classes of workmen is also very beneficial. "It aint the drink, but the company, I goes for," is the confession of many a poor tippler; and he here finds not only a larger, but better and more obliging company of his own class than he can get elsewhere, and he becomes as civil and obliging as the rest. One of this class told his wife the other day, "I didn't suppose I ever could have felt so happy as I have been since I went to the hall." The joyful atmosphere is certainly very infectious, as I myself have witnessed.

It is too early for us to decide the question of these places being wholly self-supporting; but we can see that the men's pence will go a long way towards this great desideratum. Had space permitted, I would also like to have given a rough statement of the first cost and working expenses required in to n or country places, but I have already outrun my bounds in the zeal with which I have advocated the cause.

On receipt of two postage stamps I will gladly forward by post the rules, &c., by which we are governed, should any of your readers purpose opening similar establishments.

I am, yours respectfully, W. C. W.

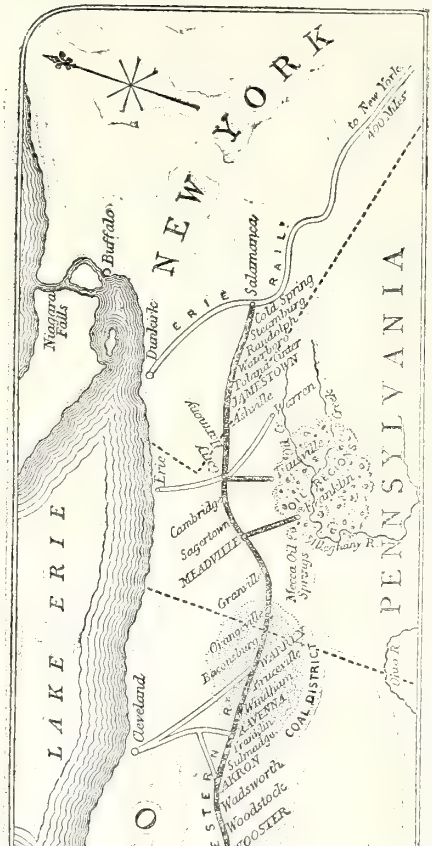
10, Brunswick-place, Southampton.

MR. PAUL'S PAPER ON PEAT.

SIR,—In the report of the discussion which followed the reading of the paper by Mr. Paul, a slight error occurs, which I shall be glad if you will allow me to correct. The line of railway which has opened up communication with the oil region of Pennsylvania is the Atlantic and Great Western Railway of America, which is connected with the New York and Erie line. A further section was opened to Meadville, in Pennsylvania, last month, and a branch thence to Franklin is approaching completion. By the kindness of the Secretary I am enabled to enclose an engraving—(see next page)—which will indicate the locality of the famous oil wells of Pennsylvania. I am, &c.,

JOHN CASSELL.

La Belle Sauvage-yard, Ludgate-hill, E.C., Dec. 2, 1862.



Atlantic & Great Western Railway, New York, Pennsylvania & Ohio.

Proceedings of Institutions.

Glasgow Athenæum.—At the examination of the Society of Arts, held in May last, forty-one students of the Glasgow Athenæum obtained thirty-three certificates —26 first-class, 17 second-class, and 13 third-class—besides eight prizes. In addition to these rewards of merit, Hugh Tennent, Esq., of Errol, awarded a prize of £5 each to the four students who had most distinguished themselves, viz., John Allan, John Jackson, Robert Rodman, and Robert James Bridge. At the distribution of the prizes, which took place on Thursday, the 30th Oct., Mr. Tennent handsomely placed £20 at the disposal of the directors, to be given to those students of the present session who excel the most at the examination in May next. It is understood that several other gentlemen have intimated their intention to imitate so excellent an example.

London Mechanics' Institution.—The distribution of prizes and certificates of the Society of Arts, obtained by members of this Institution, took place on Wednesday, the 5th Nov., Harry Chester, Esq., presiding. In opening the proceedings, the chairman said the duty he had to discharge could not be otherwise than agreeable, especially to one who had had some share in originating and carrying out the system of Examination, one of the results of which was the interesting ceremony about to take place. He was glad to be able to congratulate the London Mechanics' Institution on the honourable position it occupied in relation to the Society of Arts' Examinations, which proved not only that the instruction that it afforded to its members was of a sound and satisfactory description, but that it possessed a highly-efficient Local Board of Examiners. Indeed, it was impossible to conceive how a Local Board could better discharge its functions; for he found that out of the forty-eight candidates it had sent up to the Society of Arts' Examinations, during the last four years, only one had failed to obtain a certificate; and during the past three years the thirty-nine candidates sent up had obtained, between them, fifty certificates, besides several prizes, not a single failure having taken place. Several of the students now about to receive certificates had, in previous years, obtained similar marks of distinction in other branches of knowledge, either in London or elsewhere; showing that the effect of the Examinations had been to induce students to come up year after year, and to persevere in their studies. And one of the recipients, Mr. Macdonald, who now took first-class certificates in book-keeping and practical mechanics, with money-prizes of £5 and £3, had been nominated by the Council of the Society of Arts to compete for a clerkship in the Privy Council Office. Having explained the nature of the Prince Consort's annual prize of 25 guineas, the chairman said it would be very agreeable to him to find that the successful competitor next year was a member of the London Mechanics' Institution. He believed the great majority of recipients of the prizes and certificates were young men and women of high moral character, who felt that they were bound to cultivate the talents God had given them to the utmost of their power, not simply to raise themselves in their class, but to supply their minds with the perpetual sources of joy and pleasure to be derived from knowledge. The Society of Arts' Examinations were intended to supply to the middle and working classes some of the advantages which had been so long supplied to the higher classes in the Universities. Several Government appointments had been placed at the disposal of the Society for the recipients of its prizes and certificates, and he was happy to say that the candidates who had been nominated to them had, in their various posts, done great credit both to themselves and to the system of Examination by which their talents had been drawn out, and their merits revealed.—Mr. T. A. Reed, the hon. secretary of the Local Board, explained to the members the nature and advantages of the Society of Arts' Examinations, and urged on them a diligent prosecution of their studies, with a view to the possession of well attested certificates of merit. The advantage to be gained was not so much in the Examination itself, as in

the placing before the student a specific object to be attained. Let two young men with equal talent and opportunities commence the study—say of history or geography—one having the ordinary motive of a desire to advance in knowledge, while the other superadded to that the prospect, at a year's end, of a searching examination, upon the successful result of which would depend his possession of a certificate, attesting his proficiency; and who could doubt that the student influenced by the double motive would far outstrip the other who had no prospect of examination before him? Not that the desire of attaining a prize or certificate was the highest possible motive in the prosecution of one's studies—the most exalted motive in the acquisition of knowledge was the desire to apply it to the purposes of human welfare; but this rarely prevailed in early life, when the ruling intellectual principle was a love of knowledge for its own sake, to which it was the object of the Examinations to give a definite direction and an appropriate stimulus. With a view of smoothing the way to the Society of Arts' Examinations, the Local Board of the London Mechanics' Institution had instituted Special Examinations of its own, of a less formidable character. The principal classes of the Institution were examined annually, and book-prizes were awarded to the successful competitors. The requisite funds had hitherto been provided by the prizes awarded to the Local Board by the Society of Arts, supplemented by some voluntary donations; but as such prizes were no longer given, they had to rely entirely on the individual donations of the friends of the Institution. A prize of £5 had been offered to the members for the best essay "On the Right Use and Judicious Selection of Books," but none of the essays received appearing to the Local Board to be sufficiently meritorious, the prize had not been awarded. Mr. Reed then alluded to the successful results achieved at the Institution in connection with the Examinations, and the collateral benefits they had produced. The certificates and prizes of the Society of Arts were then presented by the chairman (a list has appeared in the *Journal*). The following Local Board book prizes was then distributed:—Geography, G. M. Norris; writing, Alfred Page; ditto, Caroline Hoare; arithmetic, F. Norris; grammar, Walter Kelly; French, E. M. Beard; ditto, Fanny Beard; landscape drawing, Henry Mullet; mechanical drawing, Charles Moody; shorthand, A. C. Frisbee. On the motion of Mr. Norris, seconded by Mr. Joseph (two of the recipients) a vote of thanks was unanimously accorded to the Local Board, which was briefly acknowledged by Mr. Reed. The Hon. Dudley Campbell proposed a vote of thanks to the chairman, and expressed his sense of the high value of the educational efforts made by the Society of Arts. Mr. Pearsall seconded the vote of thanks, which was unanimously adopted. The Chairman having acknowledged the compliment, the proceedings terminated.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. 1. Mr. A. Michie, "Narrative of a Journey from Tientsin to Mukden, in Manchuria." 2. Mr. Charles Mitchell Grant, "Route from Pekin to St. Petersburg, *via* Mongolia, Siberia, and Moscow."
Medical, 8½. Clinical discussion. Communications by:—1. Dr. Thudichum, "On a case of rapid wasting Palsy from structural disease of the spinal marrow." 2. Dr. Brunton, "A new auroscope, practically shown." 3. Mr. Hulke, "Fibro cellular polype from the ear." "Ivory peg used in a case of ununited fracture." 4. Dr. Jephson, "A case of Myelitis successfully treated." And other papers.

Tues. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion upon Mr. Makinson's paper "On some of the Internal Disturbing Forces of Locomotive Engines."
Zoological, 9.
Syro-Egyptian, 7½. The Rev. Mr. Cowper and Dr. Benisch, "On a Hebrew MS. of the Pentateuch, on brown skin."

Wed. ...Society of Arts, 8. Mr. John Taylor, jun., Architect, "On the Construction of Labourers' Cottages and Sanitary Building Appliances."
Graphic, 8.
Microscopical, 8.
Literary Fund, 3.
Royal Society of Literature, 4½.

Thurs...Royal, 8½.
Antiquaries, 8½.
Philological, 8.
Philosophical Club, 6.

Fri.......Astronomical, 8.

Sat ......Royal Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

Dated 11th November, 1862.

3036. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in the construction of crinoline skirts. (A com.)
3038. Capt. W. Palliser, Dublin—Imp. in the construction of ordnance, and in the projectiles to be used therewith.
3040. J. J. Parkes, London-street, Paddington—Imp. in lever bell pulls.

Dated 12th November, 1862.

3042. W. Harper, Sharples, near Bolton-le-Moors—Imp. in the construction of steam boiler and other furnaces.
3048. F. J. Clowes, 92, Southwark-bridge-road—An imp. in obtaining rotary motion.
3050. J. H. Thomson, Glenboig, Lanark, N.B.—Imp. in machinery or apparatus for finishing and dressing tiles and similar articles of clay.
3052. A. Graemiger Wallenstadt, Switzerland—Imp. in looms.

Dated 13th November, 1862.

3058. M. Defries, Houndsditch—Imp. in the manufacture or construction of lamps.
3060. R. Sykes and P. Sykes, Huddersfield—Imp. in rings used in machines for the continuous spinning, doubling, and twisting of wool and other fibrous materials.
3062. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in preserving provisions. (A com.)
3064. E. Joseph, 134, Blackfriars-road, and J. Danks, 56, Webber-row, Waterloo-road—Imp. in the manufacture of brushes, brooms, and mats.

Invention with complete Specification Filed.

3061. E. S. Ritchie, Brookline, U.S.—Having reference to the mariner's compass.—13th November, 1862.

[*From Gazette November 28th*, 1862.]

Dated 18th July, 1862.

2056. R. A. Brooman, 166, Fleet-street—Imp. in generating heat in furnaces and fire places. (A com.)

Dated 12th August, 1862.

2260. J. F. J. Leblond, Paris—Imp. in sewing machines.

Dated 29th September, 1862.

2642. J. E. Walker, King-street, Old Ford-road—Imp. in signalling on railways.

Dated 23rd October, 1862.

2855. W. Clark, 53, Chancery-lane—Imp. in sewing machines. (A com.)

Dated 25th October, 1862.

2871. G. Luke and W. Luke, 98, Mott-street, Birmingham—An improved stirrup.

Dated 27th October, 1862.

2886. H. C. R. Joubert, 18, Maddox-street—An improved method of raising and fixing at any height desired music stools, chairs, or seats.
2889. T. Pilgrim, 17, Carlisle-terrace, Fairfield-road, Bow—An imp. in locks, bolts, latches, and other fastenings.

Dated 28th October, 1862.

2904. C. S. Duncan, Inverness-road, Bayswater—An improved compound or material for coating or covering metallic and vegetable substances to preserve them from corrosion or decay.

Dated 31st October, 1862.

2950. F. E. Sickels, Bute-street, Brompton—Imp. in the means of steering and manœuvring ships or boats, and in the apparatus connected therewith, which apparatus is also applicable for pumping and lifting weights.

Dated 1st November, 1862.

2954. W. Tarr, 112, York-street, Oxford-street, Manchester, and E. Farr, 40, Cavendish-street, Oxford-street, Manchester—An imp. in pianofortes.

2956. M. Merryweather and R. M. Merryweather, Long Acre, and E. Field, Buckingham-street, Adelphi—Imp. in steam fire engines, part of which improvements are applicable also to other purposes.

Dated 3rd November, 1862.

2962. F. Tussaud, 105, Marylebone-road—An improved machine for cutting metal, also applicable to cutting other substances.

Dated 4th November, 1862.

2982. P. W. Reuter, Buckland-crescent, St. John's-wood—Imp. in dyeing. (A com.)

Dated 5th November, 1862.

2993. R. A. Brooman, 166, Fleet-street—Imp. in commodes or water closets. (A com.)

Dated 6th November, 1862.

3005. B. T. U. Monin, 60, Boulevart de Strasbourg, Paris—Imp. in breech-loading fire-arms.

Dated 7th November, 1862.

3009. M. A. F. Mennons, Paris—Imp. in the manufacture of paper. (A com.)

3011. W. Clark, 53, Chancery-lane—Imp. in the means of utilising refuse and azoted matters of commerce. (A com.)

3013. T. Greenwood and J. Schofield, Rochdale—Imp. in mules for spinning and doubling.

Dated 8th November, 1862.

3015. H. Gardner, Chaple Town, Leeds—Imp. in machinery for treating flax and other fibrous materials preparatory for manufacturing purposes, the said machinery being also applicable for pressing, rolling, grinding, pulverising, or mixing various other substances.

3017. G. H. Ogston, Mincing lane—Imp. in treating nitrous acid and nitric oxide in order to convert them into nitric acid.

3019. W. Simpson, Liverpool—Imp. applicable to letter boxes and other like receptacles.

3020. G. L. Locke, Hampstead New-road, and J. Clark, High-street, Kentish-town—Imp. in the motive mechanism of pianofortes.

3021. E. Sonstadt, 3, Stewart-place, Alfred-street-south, Nottingham—Imp. in the manufacture of the metal magnesium.

3023. J. Mellodew and T. Mellodew, Moorside Mills, Oldham, and C. W. Kesselmeycr, Manchester—Imp. in looms for weaving.

Dated 10th November, 1862.

3025. C. Connell, Glasgow—Imp. in constructing ships or vessels.

3029. R. R. Holmes, British Museum—Imp. in folding chairs and seats.

3031. J. Shanks, Arbroath—Imp. in mowing machines.

3033. J. Easton, jun., and J. C. Amos, Grove, Southwark—Improved machinery for sawing wood.

3035. G. F. Lyster, Liverpool—Imp. in apparatus for elevating or otherwise transmitting grain and other granular substances.

Dated 11th November, 1862.

3037. W. Booth, J. Booth, and T. Booth, Oldham—Imp. in rotary engines.

3041. E. Marriott, Miles Platting, Manchester, and S. Holroyd, Manchester—Imp. in the purification of gas, and in obtaining certain useful products therefrom.

Dated 12th November, 1862.

3043. W. Galloway and J. Galloway, Manchester—Imp. in machinery or apparatus for cutting, shaping, punching, and compressing metals.

3044. G. Smith, Phœnix Chemical Works, Cobden-street, Stewart's-lane, Battersea—Certain imp. in obtaining colouring matter.

3045. W. Dobson, Nottingham—Imp. in apparatus used in dressing lace or other fabrics.

3046. C. Socin, 2, Thavies-inn, Holborn—Imp. in looms for weaving ribbons.

3049. J. Faulding, 340, Euston-road—Imp. in locomotive engines.

3051. Admiral J. A. Duntze, Woolwich-common—Improved apparatus for communicating rotary motion to shafts or axles for various purposes. (A com.)

Dated 13th November, 1862.

3054. G. W. Rendel, Newcastle-on-Tyne—An improved method of strengthening and hardening cannon made wholly or partially of carbonised iron or steel, or the barrels or other parts thereof.

Dated 14th November, 1862.

3068. W. H. Andrew, Sheffield—An imp. in scissors and shears.

Dated 15th November, 1862.

3084. F. Palmer, Northumberland-street, Strand—Imp. in projectiles.

Dated 17th November, 1862.

3086. F. Rhales, Albert-street, Camden-road—Imp. in envelopes, with the view to affording better security thereby.

3088. D. Thomson, Grosvenor-road—Imp. in screw cocks.

Dated 18th November, 1862.

3100. N. Thompson, 15, Abbey-garden, St. John's-wood—Imp. in apparatus for stopping bottles, jars, and other vessels.

3102. J. Oxley, Frome, Somersetshire—Imp. in apparatus for separating liquids from substances.

Dated 19th November, 1862.

3014. H. J. F. Marmet, 4, South-street, Finsbury—Some imp. in the construction of lamps.

3106. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of cast steel.

3108. J. Arbos, Barcelona—Imp. in generating certain gases for obtaining motive power, and in the apparatus employed therein.

3110. C. Kilner, 2, Grove-cottages, Albion-grove, Islington, and G. Kilner, W. Kilner, and J. Kilner, Thornhill Lees, near Dewsbury, Yorkshire—Imp. in means or apparatus for the manufacture of glass.

3112. R. Hardman, Bolton-le-Moors — Certain imp. iu looms for weaving.

Dated 20th November, 1862.

3116. C. Stevens, 31, Charing-cross—An improved brick-making machine. (A com.)

3118. F. Fletcher, Birmingham—Imp. in the arrangement of a vessel or vessels for the compression of air as applicable to lift or force pumps.

3122. R. B. Seeley, Mortlake, Surrey—Imp. in inkstands.

3124. W. Bottomley, Bramley, Leeds—Imp. in machinery for stiffening woollen and other fabrics.

Patents Sealed.

[*From Gazette, November 28th*, 1862.]

November 28th.

1625. P. U. Pyras.
1648. T. T. Lawden.
1657. A. J. Sax.
1661. J. Key and F. Potts.
1673. J. Biers.
1674. S. Weston.
1675. J. L. Norton.
1676. J. Fincham.
1677. A. H. Perry.
1680. W. James.
1683. G. Allibon and E. Snell.
1684. G. B. Toselli.
1688. E. Scheutz.
1692. G. Rydill.
1719. J. M. Ryo-Catteau.
1723. A. Knowles.
1732. J. B. Ingle.
2020. S. Partridge.
2043. M. Kurts.
2078. S. Lord and J. Lord.
2395. H. Jones.
2656. G. Haseltine.

[*From Gazette, December 2nd*, 1862.]

December 2nd.

1681. T. Alcock.
1694. J. Bell.
1696. J. M. Stanley & J. Stanley.
1703. W. E. Newton.
1707. W. R. Jeune.
1710. A. J. Adams.
1711. G. D. Hatton.
1713. C. Hook.
1718. J. Keeling.
1748. F. Tolhausen.
1776. R. Hicks.
1786. A. Crestadoro.
1794. W. Clark.
1796. J. Kellow and H. Short.
1805. A. Howat.
1875. T. R. Tebbutt.
2186. W. E. Newton.
2628. J. Milner, R. D. Milner, and F. Hurd.
2677. T. Greenwood.
2717. T. Ratcliffe.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, December 2nd*, 1862.]

November 25th.

2673. G. E. Donisthorpe
2676. L. J. Vandecasteele.
2677. C. Bedells.
2706. B. Samuelson and W. Manwaring.
2713. G. J. Firmin.
2859. D. J. Fleetwood.

November 26th.

2694. R. A. Brooman.

November 29th.

2720. J. Cocks.
2723. J. Paton.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, December 2nd*, 1862.]

November 25th.

2705. E. J. Davis.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No.	Date of Registration.	Title.	Name.	Address.
4525	Nov. 18	A Paté Holder	Blumberg and Company ...	Carman-street West, E.C.
526	,, ,,	Improved Shoe Sole Cutter	William Reaney	Bernard Works, Sheffield.
527	,, 27	Lantern	Hodge and Reed	100 and 101, Hatton-garden, E.C.

Journal of the Society of Arts.

FRIDAY, DECEMBER 12, 1862.

NOTICE TO MEMBERS AND INSTITUTIONS.

Exhibition Catalogues.

Her Majesty's Commissioners for the International Exhibition of 1862 have placed at the disposal of the Council, for distribution to the Members of the Society and Members of the Institutions in Union, copies of the Industrial and Fine Art Catalogues.

Members of the Society desiring to have copies of each of these Catalogues may have them on application, either personally or by an authorised agent, at the Society's House.

Secretaries of Institutions in Union may have a limited number of copies placed at their disposal for distribution amongst their Members, on making a similar application.

General Index.

A general Index to the first ten volumes of the *Journal* will shortly be published, which may be bound with the last volume. Members who desire to have copies (which will be supplied *gratis*) are requested to apply to the Secretary as early as possible, in order that a sufficient number may be printed.

EXAMINATIONS, 1863. — NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The attention of Secretaries of Institutions and Local Educational Boards is specially called to the following extract from the programme of examinations for 1863:—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1863. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Whenever this is the case, the names and addresses of the members, both of District Board and of its Branch Boards must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

FOURTH ORDINARY MEETING.

Wednesday, December 10, 1862.

The Fourth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 10th inst., Thomas Winkworth, Esq., Member of the Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Bradley, John	129, Fore-street-hill, Exeter.
Duck, George N.	Blue House, Stockton-on-Tees
Gowland, Edward B.	1, Brecknock-street, Camden Town, N.W.
Hewlett, Alfred	Haigh Colliery, near Wigan.
Lister, John	Shibben Hall, near Halifax.
McBride, Dr. Henry	Gilford, Co. Down, Ireland.
Mitchell, Wm. Lawrence	22, Richmond-street, S.
Noden, Edward Byron	Terrace House, Old Kent-road, S.E.
Rotheram, Alexander	Holloway Mills, N.
Scott, Thomas	36, Randolph Cliff, Edinburgh
Scott, William	12, Westbourne place, Eaton-square, S.W.
Smyth, Samuel R.	Dover.
Steinthal, G. A.	14, Little Fore-street, E.C.

And as Honorary Corresponding Member,

Mairet, Sylvain	Locle, Switzerland.

The following Candidates were balloted for and duly elected members of the Society:—

Avery, Joseph	81, Great Portland-street, W.
Bowman, George	(J. Bowman and Son), Langholm.
Brown, Alfred	115, Whitechapel, E.
Canton, Edwin, F.R.C S.	30, Montague-place, Russell-square, W.C.
Crichley, Henry	Bromfield House, Birmingham.
Duppa, Duppa	Longville, Wistanstow, Shropshire.
Edwards, Charles Stuart.	64, Friday-street, E.C.
Fenton, Hugh	Queen's Ferry Wire Rope Works, near Flint, North Wales.
Geary, John	4, Francis-ter. Prince of Wales-road, Kentish-town, N.W.
Goss, W. H.	Stoke-on-Trent.
Gregory, Henry	Herne-hill, Dulwich, S.
Hamilton, Edward	500, Oxford-street, W.C.
Hobbs, Thomas	15, Earl's-court-gardens, Old Brompton, S.W.
Hutton, John	10, Mark-lane, E.C.
Klaber, Herrman	Albion-pl., London-wall, E.C.
Knewstub, Fabian	33, St. James's-street, S.W.
Launspack, Louis	9, Upper Berkeley-st. West, Hyde-park, W.
Mathews, George	Upper Russell-street, Bermondsey, S.E.
McDougall, Archibald	11, Upper Thames-street, E.C.
McLachlan, James	35, St. James's-street, S.W.
Mitford, Bertram	Cheltenham.
Moore, Charles	Rose Hill, Swansea.
Morant, Robert	91, New Bond-street, W.
Norris, J.	36, Little Russell-street, W.C.
Pilcher, W. F.	Morgan's-lane, Tooley-st. E.C.
Quarm, Thomas	Rose-villa, St. John's-road, Brixton, S.
Radclyffe, Leopold Henry	30, Hanway-street, Oxford-street, W.
Rivière, Robert	196, Piccadilly, W.
Scott, Henry D.	Market-place, Boston, Lincolnshire
Scott, Robson J.	8, Whitefriars-street, E.C.
Shaw, James	2, Royal Exchange-ct., Glasgow, and 150, Leadenhall-street, E.C.
Smith, Charles	43, Upper Baker-street, N.W.
Stephenson, James	Patent Wire Rope Works, Millwall, E.
Thompson, Henry	Albert-cottage, Weybridge-heath, Surrey.
Watkins, Herbert	215, Regent-street, W.

Willans, Jacob Geoghegan	Belfast, Ireland, and 9, Phillimore-terrace, Kensington, W.
Willoughby, de Eresby, Lord	142, Piccadilly, W.
Wood, Wm. Robert	Carlisle-house, Brighton.

The following Institution has been taken into Union since the last announcement:—

Gilford (Co. Down, Ireland) Young Men's Mutual Improvement Society.

The Paper read was—

ON THE CONSTRUCTION OF LABOURERS' COTTAGES AND SANITARY BUILDING APPLIANCES.

By John Taylor, Jun., Architect.

The subject to which I wish to direct your attention this evening, is in an architectural and artistic view, a very humble one, but, in a philanthropic sense, one of unsurpassed importance.

It may be asked, why do I take this subject upon myself before this Society? In my earlier years my efforts in this direction were fostered by this Society, and rewarded by the decoration I now feel proud to possess before you. Since then, more than twenty years of professional experience have added to my knowledge in these matters, and I now find myself one of the 30 of the earliest of the 3,000 members of this Society.

I know that a considerable amount of elocution is necessary in addressing so large an assembly, and this I have not; so I must ask your kind indulgence while I endeavour to explain my subject.

During my practice, whenever my attention has been called to any defects in our existing mode of building, I have sought and often found remedies; these have become the subject of some ten patents. My object has certainly not been to become an inventor, but they have, as it were, fallen to my lot, and, besides inventing them, I have been enabled practically to carry them out and introduce them into numerous buildings of every description, and I may safely say they have all been recognised as improvements, and paid for by my clients as such, though of course up to this time they have not been applicable to the labourer's cottage.

Representations of some of these buildings are now on the wall before you, viz., stations on the London, Chatham, and Dover railway; the Sevenoaks railway; villas in Surrey, Dorsetshire, Middlesex, &c.

We are all, no doubt, well aware of the efforts that have been made to improve the condition of the labourer by improving his dwelling, and great has been the benefit obtained; but I think our over anxiety to provide him with a habitation that should come up to our own views and acquirements, rather than to what his wishes, habits, and inclination aspire to, have retarded much of that widespread benefit which might otherwise have been expected. For my own part, I would rather give the labouring multitude something better than they now have, than endeavour to make a few model labourers and labourers' homes.

Our experience, I think, has already taught us that, to build proper abodes for the working classes, will not return a remunerative per-centage; but we may, I think, with a reasonable prospect of success, endeavour to give the labourer something better than he has, and so gradually prepare him for the more perfect abode which we all hope in future time he may obtain.

I think a very grave error is made when a single penny is expended in architectural effect. Finishings and decorations, whereby the dwelling is reduced in size and the proper accommodation decreased, so that turn-up bedsteads are found in sitting-rooms, and other such like expedients resorted to, even when such embellishments are carried out with every regard to economy, tend to increase the difficulty of producing a plain, humble, healthy cottage at a reasonable expense; and hence the inducement to resort to many of the cheap shams and building contrivances of the present day. We are so apt for ourselves to require architectural effect, genteel appearance, and decorations within a limited rental, that it is becoming apparent that no honest builder can get a sufficiently remunerative rent. It is only the so-called "duffing builder" that knows how to set about this. It cannot be wondered at that, in the endeavour to build the labourer's cottage, resort is so often had to what is understood by "cheap building," although the after experience in repairs discourages those who have been misled, so that injury results where benefit was expected.

I will now explain the manner of constructing damp-resisting foundations, ventilated floors, or paving, dry walls, and a tight, warm roof.

The question that must arise in your minds is, that granted all these are improvements, how are they applicable to a labourer's cottage? My answer is, that a mode of effecting this has recently occurred to me, and, although it has become the subject of recent patents, I now declare that any who wish to be supplied by me with such materials for the purpose only of constructing dwellings for the labouring poor, shall have them free from all royalties or patent charges whatever, so that a larger, healthier, and cheaper cottage may be built at a less cost than has before been done.

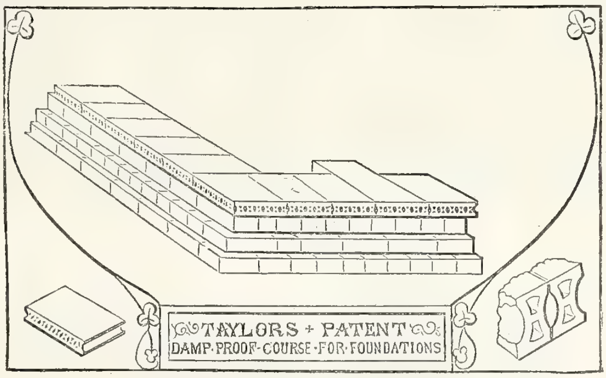
I will, however, first direct your attention to the plan of a double cottage, which contains on the ground floor a living room or kitchen, 12ft. by 12ft.; a washhouse or scullery, 11ft. 6in. by 9ft.; a larder, 5ft. by 3ft. 6in.; a store, 3ft. 6in. by 3ft. 7in.; and a large closet to the living room. In the wash-house are a good oven, grate, copper, sink, and dresser, and in the living room a range, with oven and boiler. There is a back-door out of the scullery, and a door of communication between scullery and kitchen. The entrance door is in front, where there is a small lobby to the living room and staircase; this lobby has also a pent externally for shelter. Upon the floor above is a bedroom for the parents, one for girls, another for boys; out of the parents' room is a linen closet and cupboard. The whole is comprised within four walls, without breaks, presenting the least surface to the external atmosphere, a great object in this climate. All the flues are collected into one central shaft; the roof is a simple lean-to, from party-wall to side-wall. There are therefore no gutters, vallies, or other intricacies of roof, and all the water falls into one length of eaves-guttering, down one down-pipe into a rain water-butt. No doubt some portions of this plan have often been seen, but its simplification and adaptation to my peculiar mode of construction is what I claim your attention to. It would have been easy, and certainly very tempting, to have added breaks and gables, &c., and so to have produced a more picturesque effect. The difficulty has been to avoid this, and economise cost in every way.

I will now proceed to explain the several peculiarities of construction, and, firstly, as to the foundations.

No doubt you have often observed and felt the ill effects of damp rising up the walls by capillary attraction, the most fruitful source of an unhealthy dwelling. Stagnant and impure matters in the soil are sucked many feet up the walls, and become evaporated into the rooms—the higher the temperature the quicker the evaporation, and the renewal of the noxious supply. I recollect that when the Victoria Church, in the Isle of Dogs (the church so celebrated as connected with "Londoners over the Border"), was about to be built, I was asked to visit the spot. I found the soil a deep bog; the cottages of the poor in the neighbourhood showed fearfully the effect of damp, rising up the walls some six or seven feet in height; the wretched inhabitants, as is too frequently the case, excluded as much air as possible, and so kept up the temperature, that the evaporation filled the rooms with foul vapour, and the

result was ague and fever; and I think you would discredit me if I stated the quantity of "pitch pills" consumed as a cheap, and, therefore, the only available, specific. The frost, acting upon the damp walls, destroyed the mortar and injured the bricks, and the ruin of the building was evident. In the church alluded to, my patent damp proof course (Fig. 1) was introduced, and the damp so effectually cut off, that an observer, looking through any part of the walls at a height of a foot above the ground, could see the traffic on the other side. The usual means employed hitherto to prevent this were either a layer of asphalte, sheet lead, or slates in cement; and

Fig. 1.



recently, in attempts at *cheap* cottage building, we hear of a layer of "gas tar and sand," a layer of "gas tar and powdered slate," a layer of "boiling pitch," a course of "calico immersed in tar and pitch." I think we may next expect to hear of a "Holloway's Damp-Resisting Ointment."

In the construction of foundations, three essentials have been hitherto partially effected by as many separate means:—

1st. Damp prevented rising up the walls by the means before named.

2nd. The introduction of air by air-bricks at intervals.

3rd. Strengthening and bonding by the use of rough York stone, &c.

In my Damp-Proof Course these effects are combined:—

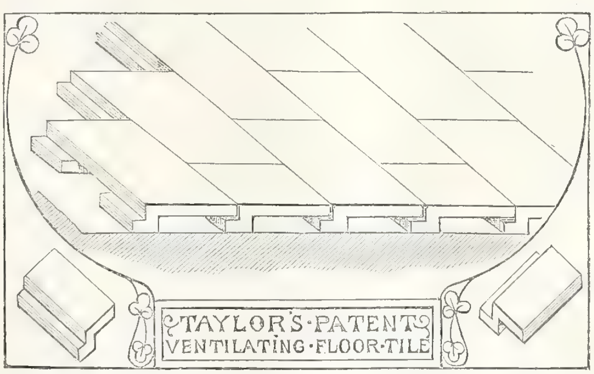
Damp rising is completely prevented by a highly vitrified and non-absorbent material, having an air space through the joints.

Air is supplied through the perforations, securing a circulation beneath the surface of the walls.

Strengthening and bonding are effected by the use of an imperishable material, capable of sustaining 600 feet of vertical brickwork upon each superficial foot. These three requirements are economically combined in the one article, with a saving of one course of brickwork in the height of the building.

The advantages to health and comfort that a properly-constructed wooden floor possesses over stone, brick, tile, or other paving, are well known; the latter, we find, laid upon the earth, or some other medium in connection with it, and damp rising is again the cause of cold and discomfort; and if the surface of the ground beneath any single tile becomes soft or defective, that tile sinks, the surface becomes uneven, and the paving is quickly dilapidated. My Patent Ventilated Paving Tile (Fig. 2) for floors or pavement is made with an under projecting rib or flange

Fig. 2.



which, when laid, forms the bearer of the tile, and extends beyond the edge, receiving upon it the other edge of a similar tile, so that the rib not only acts as the bearer of the tile of which it forms a part, but it also forms the bearer of one edge of the next tile, leaving a space under the tile for the free circulation of air, which is there introduced through the Damp Proof Course before described, and, that the air may circulate transversely, as well as longitudinally, in the spaces under the tiles, openings are left in the ribs for the air to pass laterally through from the space under one row of tiles into the space under the next row. In beginning to lay down a pavement, a row of tiles is used, having an additional under rib; the air thus circulates freely under every part of the pavement, insuring its perfect dryness, and it becomes, in all respects, a suitable floor for a cottage, at a far less ex-

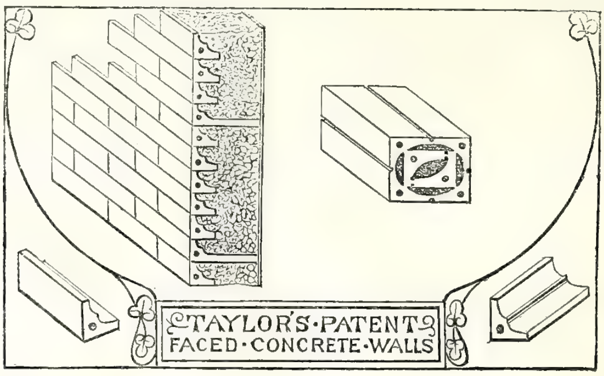
pense than any description of wooden floor, and, when we consider that there is no necessity for floor joists and sleeper-walls, the saving is very considerable.

We now come to the bulk of the building, viz. the walls. Ordinary brickwork, one brick thick, I consider totally unfitted for the abode of any human being. The single brick readily absorbs rain and moisture and the through mortar joint quickly conveys it from the exterior to the interior. Horizontal bond is studied and insisted upon by all careful builders, but, strange to say, vertical bond is never thought of; hence we see the one-brick wall, perhaps strong enough to bear the intended weight, but not stiff enough to stand even during its erection. Thicker walls are too expensive for a labourer's cottage. In seeking for a substitute, where economy is to be considered, the bulk of the material must be found upon the spot or in the locality, and nothing is more generally to be found than the necessary materials for concrete.

We all know that concrete is ordinarily composed of gravel and lime, and is in its proper place when in a trench of a foundation. Being retained therein, and prevented spreading, it will sustain any weight we like to place upon it, but when used in building walls, it is not so retained, and is incapable of enduring cross strains, when the boards, which are, in fact, the moulds in which the cast has been made, are removed. The construction mainly depends upon the adhesive quality of the lime or cement, and when it is no longer retained, cross strain and other causes produce cracks and settlement, and the action of the weather upon the surface soon produces premature decay.

To understand how my Patent Cottage Walls are constructed, observe the diagram on the right hand in Fig. 3, representing a hollow block which certainly at first appears what no one can understand. It is made by pressing clay through a die. The dark portions represent hollow spaces

Fig. 3.



through which the heat readily acts throughout the block where desired, during the process of burning in the kiln, and, when standing on end it occupies the least possible kiln room. It has been partially separated by knives in the die, but holds together firmly enough during burning in the kiln and carriage to the intended building. Just before use, the bricklayer or labourer readily separates it into six bricks specially adapted for the reception of concrete.

It will be readily seen that in all the several processes of manufacture, six bricks have been produced instead of one. These blocks, or bricks, when used, are laid by the bricklayer on each side of the intended wall, distant from each other the thickness of it, as shown at the left hand of Fig. 3. The labourer then lays concrete in the trench thus formed, the vertical pressure upon the flanges counteracts the outward thrust, and thus the concrete is retained as in a trench, the mould wherein the cast was made remaining to protect the wall from damp, and to prevent the decay of the external surfaces of the concrete by the weather.

Thus each course is thoroughly constructive, and even first-class houses may be thus built to any reasonable height. In a cottage wall, 9 in. of thickness is sufficient, requiring only one course of blocks externally, with the bonding blocks at intervals, and the use of a moveable board on the inner face during its construction. After this a little rendering inside with lime, or Scott's Cement, which is better, finishes the inner face.

It is calculated that a rod of ordinary brick-work requires 4,352 bricks, which (at, say 32s. per 1,000) costs £7. One rod of the patent walling requires 1,450 of my bricks, which (at 25s. per 1,000), for labourers' cottages, only costs £1 16s. 3d.; add to this the cubical contents of the concrete, 9⅔ yards, at 16s. 8d. (calculating gravel at 2s. per yard, and lime at 10s.), £1 12s. 8d., together; £3 8s. 11d. the rod of 14-inch work, as against £7 the rod of brickwork.

Now, as to the weight; the 4,352 bricks weigh 9 ton 14 cwt.; the 1,450 of my bricks weigh 1 ton 9 cwt. We thus see that these blocks can be sent in a railway truck or otherwise long distances, where we could never hope to send bricks. When my blocks for facing ordinary brick-work are used, they cause continuous hollow air spaces to be left within the wall, and a great saving in bricks results. Vertical bond is obtained, and the yielding mortar joints are strengthened; and I have found that the walls of a house thus constructed become so quickly dry, that they may be papered almost immediately.

We now come to the crowning matter of my subject, viz., the roof.

Slate is generally applicable for roofing, as it admits of being laid to a flat pitch, and is light, but is so absorbent of heat that rooms in the roof become unbearable.

Plain tiling has not this objection, but must be laid to a steeper pitch, is much heavier, being nearly of double the thickness, and requiring greater strength of timber.

Pan tiling is lighter, but so pervious to weather, as to be only suitable for sheds and similar buildings.

My patent tiles may be laid to as flat a pitch as slates; their weight is 656 lbs. per square. Plain tiling is 1,624 lbs. per square. Thus it appears that it is less than half the weight of ordinary tiling, pleasing in appearance, and combines all the advantages of slates and tiling without the drawbacks attending them. The price is £4 10s. per thousand, being enough to cover a square for sixteen shillings.

You will observe on the diagram (Fig. 4) that I make a tile wider at one end than at the other, and having flanges raised at two sides, the narrow end becomes the lower end of the lower or trough tile fitting into the wider end. The same tile reversed becomes the upper or capping tile; the two notches in the flanges enable each tile to take an even bearing upon the tile beneath, and allow all the

ends of the tiles to range horizontally. The nib upon the upper part of the tile gives the necessary gauge, and firmly secures the tiles the one to the other.

The ridges are formed of a V shape, having all their joints lidded or capped. These ridges are applicable for any ordinary slated roof, and all screw holes and their defects are avoided.

Having now set before you such particulars as time wil permit, I will only just briefly conclude by stating that all the patent materials necessary for the erection of the pair of cottages will be as follows:—

The damp-proof course	£40 0 0
The ventilating paving	
The wall blocks	
The roofing tiles	

I think we may now, therefore, reasonably expect that the remaining works may be done for such a cost as that a larger, healthier, and cheaper cottage may be available for the labourer than hitherto.

Having directed our time and attention thus far to the labourer's interest, let us look a little to our own, and at this season what is more constantly forced upon our attention than the discomforts that appear to be almost inseparable from our own firesides? We all know what is considered the next evil to a scolding wife.

Smoke, undeprived of its carbon or soot (which is fuel) contaminates the atmosphere, disfigures a decays ou

Fig. 4.

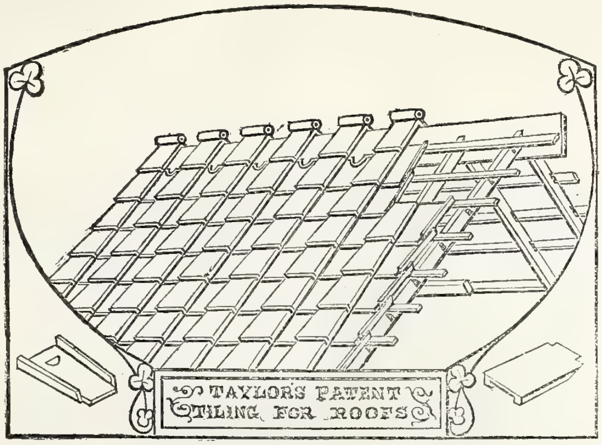
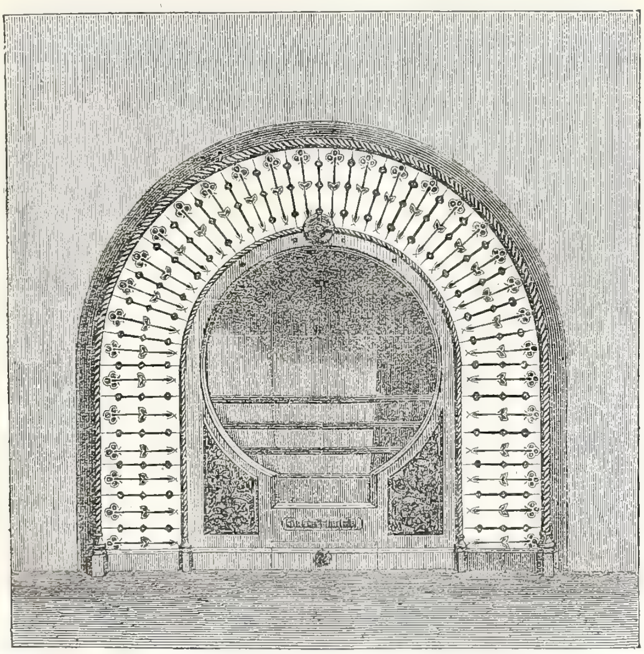


Fig. 5.



FRONT VIEW OF THE SMOKE CONSUMING AND VENTILATING GRATE.

buildings, and an incalculable amount of annoyance arises rom smoke and smoky chimneys. Mechanical contrivances to effect the combustion of smoke are ineffective when left, as they must often be, to the care of our ordinary domestic servants. There is an annual loss in London alone of seventy-five per cent. of heat, (an acknowledged fact) which escapes up the chimney without adding to the warmth of the apartment. The calculation of this does not afford us any consolation in our discomfort.

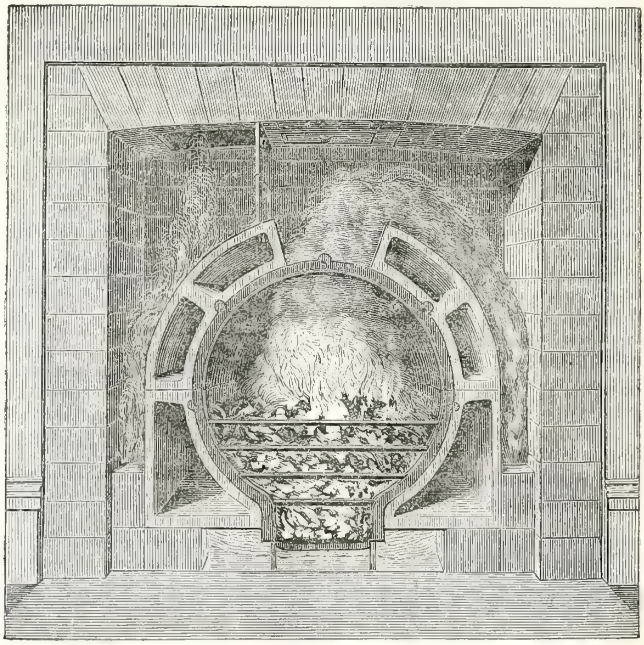
The air necessary to support combustion makes its way to the fire from door or window, chink, or crevice, and visits our backs with hurtful draughts in proportion to the warmth we are receiving in front.

A frequent cause of the chimney smoking is that it becomes filled with the air from the apartment, which, rushing in above the fire, lowers the temperature and renders the flue incapable of acting as a sufficiently rarefied ventilating shaft, and often incapable of even conveying away the smoke at all.

The peculiar features in my patent grates (Figs. 5 and 6) are as follows:—

When the register is closed, the smoke, having ascended

Fig. 6.



VIEW WITH FRONT REMOVED, SHOWING THE ACTION.

from the fuel, and become mixed with atmospheric air, descends, and passes through the hottest part of the fire, where the carbon or soot in the smoke is consumed as fuel.

The heat which would have rushed up the chimney, calculated at 75 per cent., passes down and around the hollow fire lumps of which the grate is formed, and the external air, with which these communicate, enters the apartment in a large body, moderately warmed, not heated.

The apartment is supplied with moderately warmed instead of cold air, from door or window, and thus thorough ventilation is effected.

The cold air cannot rush up the chimney; the flue is therefore rendered a powerful extracting shaft for ventilation, and a highly rarefied, and consequently effectual, passage for the products of combustion, thus obviating another fruitful source of smoky chimneys.

Should the warmth be too great, the register can be opened and the action of an ordinary grate will take place.

In addition to these advantages, the fire is always under perfect control, and may at all times be brought to any degree of brightness.

Its combustion of fuel is so perfect, that what remains in the ash-drawer, after the day's consumption, if proper attention has been paid, might be taken away in the palm of the hand.

The occupation of the sweep will be nearly dispensed with.

I shall at all times be most heppy to give any further explanation or information at my offices in Parliament-street.

DISCUSSION.

The Chairman said that the Council had just been informed that Major-General Tremenheere, who was to have presided that evening, was unable to leave his home, owing to the illness of his son, which they regretted, as well on his own account as on that of the meeting, the subject of the paper being one in which that gentleman took great interest. It was difficult, indeed, to exaggerate its importance, and it was fortunately one that just now engaged the attention of the promoters of social economy. It was one to which their late lamented Royal President addressed his active and practical mind, and it would be remembered that he erected a pair of model cottages near the Exhibition of 1851, which had been re-built, and were now to be seen on Kennington-common. The distinguished friend, also, of the labouring classes of this great metropolis, Mr. Peabody, was so impressed, during his long residence in

England, with the growing and urgent necessity for better and healthier habitations for them that, with a munificence beyond all precedent, he placed in the hands of trustees the sum of £150,000 to be devoted to this benevolent object. He (the Chairman) having, within a few days, had occasion to see that gentleman, informed him of the subject of this evening's discussion, when he expressed his regret that in consequence of the painful illness under which he was then suffering, it would be quite out of his power to be present, but he should be glad to receive particulars through the *Journal*. As regarded the paper just read, the Chairman need only remind the meeting that any gentleman who devoted his talent and energies to the development of this important branch of social science, and placed the results before the Society for examination and discussion, gave the best evidence of his earnestness, and was entitled to the gratitude of the community.

Mr. J. BAILEY DENTON said he should be sorry in any way to depreciate the paper just read by Mr. Taylor on this very important subject, but as he represented not the architectural interest, but that of agriculture, they must allow him to make a few remarks—not so much upon Mr. Taylor's paper as upon the subject generally. The paper was a very ingenious one, and he must admit that the drawings by which it was illustrated were most explicit; but there was to his mind one very manifest omission, and that was the consideration of the cost of the structure. Very much had been said and written on this subject by a great many people for many years past, and yet at the present moment we were really as much at sea, as to what description of cottages we should build, as we were 15 or 20 years ago; and he could not but feel that the paper had not dealt with the question which he thought most of those present had come to hear. The cost of cottages resolved itself practically into the rent to be paid for them, and it was no matter of congratulation to be able to build cottages that labourers could not pay rent for. Much had been endeavoured to be done by prizes and the efforts of various societies; but it was a fact that not one of those prize designs had provided for buildings that could be erected for the money which was stated as a necessary condition to the premium offered. Representing, as he did, a company which was employed very largely in the building of agricultural property, and in ascertaining the lowest prices at which, with due consideration to the sanitary requirements of the day, labourers' cottages could be built, and having himself inspected a great number of drawings, plans, and specifications for them, he was there to confess that they had not been able to build cottages for which the farm labourers of the country could pay a rent which, in itself, would give an adequate interest on the capital expended. The average cost, at the present moment, of cottages with three rooms, with water supply and the necessary fencing, was £260 a pair. He was speaking, not merely of his own experience, but advisedly, from the experience of those who were largely engaged in building; and as it was necessary, in order to encourage the building of cottages, that they should give a return of six per cent. upon the outlay, the rent would amount to £15 12s. per annum, or £7 16s. per cottage. Now, the utmost that a farm labourer could afford to pay was limited to one-seventh of his earnings, and, therefore, taking the average agricultural wages at 10s. or 11s. per week, the rent which could really be afforded was not more than 1s. 7d. or 2s. per week, which was equal to about £5 a year. Now, inasmuch as 6 per cent. upon an outlay of £130 per cottage represented £7 16s. a year, it was clear that there remained £2 16s. yet to be made up from some source in order to encourage builders to erect these cottages. That £2 16s. might fairly be paid, partly by the farmer who employed the labourer, and partly by the owner on whose estate the cottages were built, the farmer employing the labourer having the advantage of the man living on his farm, could, it was admitted, pay something towards the rent; and if they assumed that he could afford to pay 1s. per week, or £2 12s. a year, there would yet remain something for the owner to pay to make up the deficiency. £260 a pair for cottages was too large a cost, and it was an object worthy of this Society, and of the country at large, to endeavour to reduce the expense from £260 to about £200 a pair. If they could succeed in doing that, there was very little doubt they would be able to build cottages for the poor which were suitable in all particulars. As an illustration of the difference that existed in the various designs that had been placed before the world as being worthy of adoption, he might mention the fact that the cubical contents of these cottages varied as much as from 7,000 to 12,000 cubic feet. At some future time, he proposed laying before the agricultural community a tabulated statement of all the cottage designs that had received prizes of various kinds, and the extraordinary difference between them would strike anyone who had paid any attention to the subject; but no point would strike them more forcibly than the fact that none of those designs could be built for anything like the price estimated. He thought the essential object to be kept in view was a reduction of the cost of building cottages to a sum upon which the labouring population of this country could afford to pay a fair rate of interest in the shape of rent. Unless they did that, they practically did nothing, and he hoped the Society would accept what he had, with some diffidence, proposed, viz., the offering of two prizes for cottages that should be *built*—not merely designed, for there was a great difference between designing and building—a pair of cottages which should be built for £200. It might be asked why he had put them at that sum? The reason was this. In all the designs that had received commendation or prizes, there were none the estimates for which exceeded that sum; but he challenged Mr. Taylor, whose drawings were so explicit, and whose statement was so interesting, to produce a pair of his cottages built for £200, subject, of course, to one condition, that they should be built substantially, and in accordance with the rules of the Enclosure Commissioners, who had certain regulations as to substantiality. He would ask Mr. Taylor what his estimate was for a pair of cottages built upon his plan.

Mr. EBENEZER CLARKE had listened with much pleasure to the remarks of Mr. Taylor in reference to the cottages he proposed to build, and practical men interested in this subject must feel indebted to that gentleman for many of the suggestions he had made. He (Mr. Clarke) was happy to state, as bearing upon the remarks just made, that he held a contract, which was now in course of execution, for building cottages as low as £225 per pair, which were of larger cubical content than those described by Mr. Taylor. The front room was 12 feet by 10 feet, the back room being about the same size, with a wash-house at the back, and containing a capital oven, copper, sink, and dresser, and a good water-closet. There were two good rooms upstairs, and there was a porch in front. A pair of cottages upon this design had been placed opposite the eastern dome of the International Exhibition during the present year, and at Walthamstow there were sixteen pairs of cottages now erecting at the contract price he had stated. The cost of those cottages, including the freehold of the ground, would not exceed £130, and a rental of 2s. 6d. per week would give £6 10s. a year as the interest upon that amount; but it was said the landlord would expect more than that. Even if 3s. 6d. per week, or £2 12s. additional for rates and repairs, were required, for that rental they might have cottages within five miles of London which could be let to pay a fair remuneration upon the outlay. By this means a great difficulty would be overcome. Mr. Scratchley had laid down a good principle for the purchase of cottages by labourers. He had proposed that some of the money subscribed to the savings bank should be appropriated, at 4 per cent., to the purchase of la-

bourers' cottages. If a cottage could be bought for £100, the tenant would only have to pay 4 per cent. interest as rent, and to insure his life for £100, so that by the payment af £6 a year the cottage would be his in fourteen years, with the advantage that if he died in the first year, he would be able to hand over the cottage to his widow as an annuity of £10 for life. With regard to cottages in the country for agricultural labourers, there might be some difficulty, and he thought a lower price than he had mentioned would be a necessary condition. With reference to Mr. Taylor's system, it was a question with him whether country bricklayers would be able, generally, to carry out the designs, and to use the materials recommended by that gentleman, so readily as to build with them substantially as they were accustomed to do under the old brick-and-mortar system.

Mr. Charles Bagnall could confirm the remarks of the last speaker, inasmuch as he had almost completed twenty cottages in Yorkshire, upon the plan referred to, at a cost for the smaller ones of £160 the pair, and for the larger ones of £200 per pair. Those cottages originally contained only two bed-rooms, which did not admit of a proper division of sleeping apartments for a family, but at a cost of only £10 he had added another bed-room, and then the cottages had been rendered really suitable habitations for a family,

Mr. Robert Rawlinson had listened to the paper with great interest, but, looking to the diagrams before them, it occurred to him that there would be some difficulty in getting country bricklayers to put these materials together. He differed from Mr. Bailey Denton as to the question of labourers' cottages paying or not paying. He had studied this subject for the last twelve or fourteen years, and he held that it was not a question of mere pounds, shillings, and pence, as regarded the payment of rent. It was a question of moral and sanitary importance to the whole nation, and the time must come when they would have to look upon it in a national spirit, for they were now beginning to understand upon what principles society was based, and how they could best be enabled to ensure its permanence and its safety. The late Royal President of this Society, with that far-seeing intellect for which he was so distinguished, regarded this question as one of national importance, when he placed before the public those model cottages at the Exhibition of 1851; and that great man who now sat upon the throne of France had also seen and appreciated it. He appreciated the fact that the poor were in this respect powerless to help themselves; therefore, the movement must be made by those above them, and, he (Mr. Rawlinson) said advisedly that, let them work the problem as they might, they must not split straws about plans and cost; but the time was come when they must understand that a community of people must not be allowed to grovel in the mire like the lower animals, or to exist as they did in many parts of Ireland at the present time, where human beings herded together with the brutes, and being born as brutes, and living as brutes, how could we expect them to feel otherwise than as brutes? In this wealthy country he could take them to towns of large populations, where the artizans were earning from 35s. to 40s. per week, and yet could get nothing more than room tenements to put their families into, not that they were unable or unwilling to pay for better accommodation, but simply because nothing better could be obtained. How, then, could the working man raise himself in the social scale? The poor could not build for themselves, and it must be a national concern. It was argued that the question resolved itself into one of rent. He said no, and even if it did, if they worked out the problem in all its elements, it would be seen that the cost came upon the public at large, who had to pay for the neglect and misery, directly and indirectly by pauperism, by vice and crime, and by a depreciated human race. They paid it directly in the shape of provisions to be dispensed by the relieving officer. Medical men could point to rows of cottages from which came all the fever that infested a neighbourhood, and into those cottages the mass of the money went, which was expended from the poor-rates every week, and in some cases the owner of the houses, living at one end of the row, would watch for the visits of the relieving officer, and pounce upon the money for rent. Such an evil as this could only be met as a national question at least, and if they took a Christian view of it, as a Christian question. There stood rows of habitations in which it was impossible to live without the occupants sinking in the social scale. An artizan coming from the country into a large town was obliged to take his wife and young family into room tenements, where it was impossible they could live healthily, and they were stricken down by typhoid fever; it ended in either the widow following her husband to the grave, or with her children becoming permanent inmates of the union workhouse. The hollow bricks which Mr. Taylor had recommended were no doubt valuable, but he regretted that that gentleman had taken out patents for inventions of this character; he thought it doubtful whether they would be valid, for he himself had used hollow bricks years ago. He (Mr. Rawlinson) took credit for some ingenuity, but he could conscientiously say he had carefully eschewed patents; for he knew, by experience, that it was very seldom indeed that patents paid; and, looking at the question, he could see no elements of remuneration arising from the patenting of articles of the description brought before them this evening; but if Mr. Taylor found it otherwise in his practice, that was an answer to him. The advantage of concrete walls, as regarded economy, would no doubt be felt in many parts of the country, and the merits of the damp proof course could not be denied. He had made perforated bricks as early as 1845, but without a patent; and, as regarded the tile floor, it was very ingenious, but was not a plan he should be inclined to adopt. There was an old proverb that they should "never make holes for rats, except they left holes for cats." Now, there was plenty of room for rats and mice in these holes, but not sufficient for cats. Some remarks had been made as to the roof being perfectly tight upon Mr. Taylor's plan; he hoped that referred only to its being water-tight, because of all curses in a house, an air-tight roof was perhaps the greatest. The same might be said of air-tight walls and fittings, which might be made so perfect as to become the perfection of bad construction. He had been in houses where the carpentering work was so perfect as to amount to a positive evil from the entire prevention of anything like healthful ventilation; and, on the other hand, if mechanical means of ventilation were provided, they were apt to be closed by the occupants of the house through some fancied discomfort in the way of draughts, and, therefore, they were often obliged to disguise the means of giving proper ventilation to dwellings. He hoped this Society would give all the aid in its power—not that cottages should be built which the poor man was able to pay for—but such as would enable him to live as became a Christian, and properly to perform his duty to society.

Mr. Bishop wished to be favoured with some further explanation as to the stove which had been exhibited by Mr. Taylor; he should like to know in what way the smoke eventually passed off, for this did not appear from the explanation already given. It was stated that upon the smoke being evolved from the coal it was carried back, by a flue at the side of the stove, through the fire again, and the carbonic acid gas in it would, he thought, have the effect of deadening the flame in the grate. Mr. Bishop also offered some general remarks upon ventilation, and pointed out simple means adopted by him for carrying it out. With respect to the price stated in the paper of £40 for the materials of a pair of cottages, he wished to be informed whether that was the cost of the concrete walls alone.

Mr. Geo. Godwin, F.R.S., being called upon by the Chairman, had nothing particular to add to what had been said this evening, but would express the very strong

conviction he felt, no doubt in common with many others present, of the immense importance of this subject, and supposing it turned out that well-built, well-drained, and properly ventilated cottages could not be built for the labouring classes at such a sum as they could pay a proper rent upon, he said boldly they were not sufficiently paid for their labour. They were not getting out of the land that amount of sustenance, and that provision of protection from the weather, which, as human beings, they were entitled to receive. His own notion was, that cottages for the poor could be built to pay, and he thought they owed a considerable debt to Mr. Taylor for the amount of ingenuity and intelligence which he had brought to bear upon this subject, and though they might not see at first sight that the means suggested would materially cheapen the cost of cottages, it was obvious that the damp-proof course here introduced was a most important building material, and he was quite sure, as it became known, it would be most extensively used. He thought the difficulty with regard to these materials was that they could not get workmen without education to use them properly. Many years ago he had assisted a gentleman in the country in forming concrete and brick walls for cottages, the hollow in the wall being filled with concrete. It was a very ingenious plan, but he thought not so cheap as that of Mr. Taylor. He (Mr. Godwin) had, however, found it quite impossible to get other builders to take up the plan, and it gradually died out, although walls of six and seven inches thick, built in that way, had stood in a perfect state for twenty years, effectually resisting the damp, and forming altogether most efficient work. That was the difficulty which all inventors had to strive against. He had no doubt concrete was plentiful in many parts of the country, and where these bricks of Mr. Taylor's could be put into the hands of intelligent master-builders or foremen, very good and cheap houses could be constructed with this material. It had occurred to him to witness, both in town and country, the frightful condition in which the great bulk of the labouring population lived—agricultural as well as manufacturing. Many individual landlords were doing much to remedy that state of things. The Yorkshire Agricultural Society and many others had given prizes and were doing all they could to advance this object, but the field was so enormous that the efforts of a few individuals were almost useless; they scarcely touched the evil, and, at the present moment, the great bulk of the labouring population were living in such a way that a high state of health was impossible—in such a way that the evil deeds they committed were mainly the results of the condition in which they lived, the effects of which no amount of after education could counteract. All moral principles were eradicated from the minds of the children, and, do what they would, with the present system of national education, they could not remedy the damage which was done in infancy. What was the result of all this? The habitations were tenanted by a population sunk in ignorance and moral degradation. In the courts of Drury-lane and Gray's-inn-lane, there were thousands of human beings but little better than pagan savages: they knew nothing that was right; and those were the class—the dangerous class—who were at the present time making themselves so fearfully known and felt in our public streets. He had said thus much, to show that the subject before them was one of the greatest importance; and he felt that they were indebted to every gentleman who brought his intellect and practical experience to bear upon it. He begged to tender his thanks to Mr. Taylor for his valuable paper.

Mr. G. F. Wilson, F.R.S., said a very ingenious paving tile had been exhibited by Mr. Taylor, and he should be glad to be informed what was the cost per foot of that tiling, apart from the cottage generally.

Mr. Edwin Nash remarked that no material had been shown by Mr. Taylor as that which he intended for the quoins of his building, but he presumed he had some arrangement for that purpose which would match with the other portions. In some of Mr. Taylor's cottages he had seen that ordinary bricks were employed at the quoins. He thought that was an imperfection, because the quoins of a building were the parts which generally held the greatest quantity of moisture; and in plastering a new structure internally, the difficulty was to get the angles of the walls dry at the same time as the other portions. With regard to the damp-proof course, he thought that, to be effectual for the purpose for which it was designed, it ought to be placed at a not less distance from the ground than eighteen inches. The place where the splash of the rain went against the external wall was generally the dampest place, and if this damp-proof course were placed within a short distance of the ground, and the rain-splash went above it, the end it was intended to answer would not be gained. There was a tendency in the surface of the ground round a building to become relatively higher by the lapse of time, and that which had been eighteen inches from the ground originally would, in forty or fifty years, be below the level.

Mr. Liddle remarked that he was disappointed at the course which the discussion had taken. He felt, as all of his profession must feel, a deep interest in the well-housing of the poor. He resided in a district of the metropolis where a large number of the houses had been taken down for street improvements and railways, which had had the effect of dislodging a large amount of the poorer population, and thrusting them closer and closer together into places inaccessible to any persons but the relieving officer and the police, which caused their health and morals to be so fearfully deteriorated. He was in hopes that some practical suggestions would have been thrown out as to how these great evils were to be met, but the discussion had, for the most part, turned upon the cheapness with which cottages could be built for farm labourers in the country, leaving untouched the great question of providing for the moral and physical condition of the crowded masses of the working population in the Metropolis. It was a remarkable fact that whilst the population was largely increased, house accommodation had decreased; the consequence was that more persons were crowded into the houses which remained accessible to the poorer classes, and where there were formerly eight there were now, on an average, at least ten persons in a dwelling. He sincerely hoped that at some future time this question would be taken up with the seriousness which its importance demanded.

Dr. Greenhow expressed a similar disappointment to that of the preceeding speaker, at the course which the discussion had taken. He viewed the question in a different light to most of those who had spoken upon it. He felt that the great point was to build cottages especially with reference to the health of the inmates; and he hoped to have heard this evening of some fresh building appliances which would conduce to render the cottages in town more healthy than they had been hitherto. With regard to the size of which cottages should be built, Mr. Taylor had given the dimensions of twelve feet square for the rooms, but he had omitted to state the height, whether eight feet or less. Even that would afford small cubical space for a room which was occupied by a family during the daytime. The rooms above being covered by a partially slanting roof would have a still less cubical content. He did not care about the cost of the cottages; but he would say emphatically, having had long experience in those diseases which emanated from living in confined breathing spaces, that cottages of the dimensions stated, supposing the rooms to be eight feet in height, would be unwholesome, and would tend to those diseases of the lungs which arose from living in an impure atmosphere. With regard to ventilation, the only provision that he had heard mentioned in the paper was the beautiful stove of which they had had a description, and he inferred that such stoves were intended to be placed in the cottages spoken of,

though they appeared to be too expensive for such a purpose. With that exception, he had heard of no means for providing ventilation. He did not offer these remarks in disparagement of the paper, but only as bearing upon the important subject which they were met to discuss.

Mr. C. ASPREY expressed the interest he felt in this subject, and his surprise that the influential classes of the metropolis had not taken it up more warmly; if they had done so, he thought they would have met with great support, particularly if they had only laid the matter before men engaged in business. He believed the labouring populations of large towns suffered in respect of house accommodation tenfold more than those in the country; and he only hoped this paper and discussion might be the forerunner of some movement which would be beneficial to the London poor. He was an employer of labour in various forms, and he had long felt that the working-classes, with means of paying for better dwellings, were unable to obtain healthy and comfortable habitations in London. Looking to the miserable courts and alleys of Drury-lane, for example, the space now occupied by those wretched tenements might be made available for the healthy dwelling of many more families than were now located there in filth and squalor, if the houses were built upon a proper principle. He hoped there were liberality and riches enough in this great city to afford the means for furnishing the poor man with a comfortable home, so that he might bring up his family in a proper way, with greater attention to their morals than was at present the case. There were many who, like himself, would be willing to aid in forwarding this great object, and in order to make a start, he would lay down £100, either as a gift or at a low rate of interest, and if a thousand others did the same, they would at once have a fund which would be the means of doing a vast amount of good in this important matter.

Mr. SQUIRE said, having paid some attention to ventilation, he thought, for all ordinary purposes, rooms could be thoroughly ventilated by means of the ordinary ventilator placed opposite to one of Arnott's in the chimney, and when these were placed high up, they occasioned no inconvenience from draught to the inmates of the room.

Mr. JONES mentioned that upon the Duke of Buccleuch entering upon his new residence at Dalkeith, the workmanship of the fittings of the rooms was so perfect that they were all filled with smoke, which was caused by the rooms being so air-tight as to prevent proper ventilation through them, and ventilation was effected by carrying a shaft through to the roof, and from thence bringing air down to the sides of the fire-places, without disturbing the rooms in any way.

Mr. SEDDON said, having seen Mr. Taylor's inventions in action, he was happy to bear his testimony to their efficiency as far as he could judge. These were materials with which cottages and larger dwellings could be built at a much cheaper rate than before; and, as regarded sanitary appliances, the plan introduced by Mr. Taylor must be admitted to be a great improvement upon the old system. With respect to the getting these new materials properly put together by country bricklayers, he would state that he had found no difficulty in getting the work done. He had used a great many stoves of the description brought forward this evening, and although the one exhibited was ornamental and expensive, the principle had been extensively adopted in barracks and government offices, in a cheaper form. The great difficulty with regard to ventilation was where to let the air in, and it was no use to let fresh air in, without providing a means for the egress of the impure air. That was fully provided for by Mr. Taylor's stove; and where the air could not be brought in heated, it must be admitted above the level of the head, which could be done in any volume required. If there was sufficient egress for the vitiated air, the apartment would be thoroughly ventilated.

Mr. WHITE observed that it was to the owners of property they must look for the remedy of existing evils, more especially in the agricultural districts, where a reluctance was manifested to building cottages for the poor, on the ground that it would increase the poor rates; in fact, he had known instances in which cottages had been pulled down, and the labourers had had to walk several miles to and from their work. The remarks as to the necessity for better home accommodation for the poor applied with equal force to the populations of large towns. He could point to one place where, out of 1,200 houses, nearly 1,000 were rated under £7, whilst the majority of the workpeople earned large wages, and could afford to pay for better houses.

The CHAIRMAN said he had now a pleasing duty to discharge, in proposing a vote of thanks to Mr. Taylor for his valuable paper. He was sure this would be unanimously accorded.

The vote of thanks having been passed,

Mr. TAYLOR, in reply upon the discussion, said Mr. Denton had expressed his disappointment at no plan having been brought forward for building cottages for a less sum than £260 a pair; but he was answered in that respect by the gentleman who followed him, who declared that he was now engaged in erecting cottages at £225 the pair. If he (Mr. Taylor) had brought forward any specific price at which the cottages he described could be built, he should probably have been met with Mr. Denton's very proper remark, that it was only an estimate, which was not always to be relied upon. He had not come before them to advocate any particular plan of labourers' cottages, but merely to show them how the walls, roof, paving, and other things, might be built better and cheaper than they had been hitherto. He had shown that the materials for those portions of the building could be furnished at half the cost of brickwork. With respect to the dimensions of the room, a dozen medical gentlemen would probably hold as many different opinions as to what was absolutely a necessary size for a healthy apartment. With regard to the damp proof course, one gentleman had objected that it afforded facilities for the encroachments of vermin, but in his practice he had never found this inconvenience occur. Another gentleman had spoken of the necessity of having the damp proof course a sufficient distance from the ground to be out of the reach of the rain splash. In the plan he had placed before them, he had shown the course in the position for its most economical adaptation, and it was at the option of the builder how high up the wall he chose to put it. He might mention, with regard to the alleged difficulty of getting ordinary workmen to use these materials, that his plan had been experimentally adopted for military huts at Chatham, and the materials were very readily made up by the sappers employed for the purpose. The walls for huts of 40 feet long were only 6 inches thick, and the reports as to the durability of that plan of construction were so satisfactory to the authorities, that they gave orders for the erection of huts of 200 and 300 feet upon the same plan at Hounslow. He added, that he felt regret that his paper had not come up to the expectations of some gentlemen present, but he still hoped he had been able to offer some useful suggestions on the all-important subject of the improvement of the dwellings of the labouring classes.

The Secretary announced that on Wednesday evening next, the 17th inst., a Paper by Mr. Robert Hunt, F.R.S., Keeper of Mining Records, Government School of Mines, "On the Mines and Minerals of the United Kingdom," would be read.

The following letters have been received:—

SIR,—As Mr. Taylor's paper cannot fail to give a fresh impulse to the erection of improved dwellings for the working classes, you would oblige me by availing yourself of this opportunity for making known that my Eco-

nomic Museum at Perryn House, Twickenham, contains a more complete series of model designs for town and country than is perhaps to be found in any other Institution, together with illustrations and estimates of building materials, fittings, and furniture, and other indications for the guidance of those who are anxious to raise the condition of the poor.

It may be well to mention that all admissions are gratuitous, my object being purely one of popular instruction and improvement.

I am, &c.,
T. TWINING.

SIR,—It is desirable for various reasons that the general subject of Sanitary Building Appliances, in reference to the working classes, should be separately treated under the subordinate divisions of Town Homes and Country Homes; the different conditions of life under which the labourer exists in the one presenting points of consideration altogether diverse from those of the other.

In the one, systems of sanitary appliances must be directed to the individual case; in the other, the workman must be looked upon as a unit in a total, if I may so say, requiring a perfectly separate cell in a compound hive, and not an isolated nest.

Country Homes.—It is not my purpose to discuss the question from the rural point of view further than to state, as the result of my observations and inquiry, the undoubted fact that the equalisation of the poor rates would in a great degree tend to improve the home of the farm labourer and generally of those workmen whose occupation is remote from large towns.

Not unfrequently a whole parish may be met with, the proprietorship of which is limited to one or two landlords, and these will not permit the erection of the cottages necessary to house the families of the labourers working in the parish, with even the most moderate provision for the decent sleeping and general accommodation of the inmates.

In many cases the labourer has to walk weary miles morning and evening throughout the year, to and from his work, totally unnecessary for exercise, because his toil in the open air is sufficiently exhaustive for his generally spare diet, nor does he bring a fresh set of muscles into play, as would be the case with many town mechanics if exposed to a similar long walk home.

This extra and extreme exhaustion can only be avoided by an unseemly heaping together of human beings in a small compass, and the mere massing of matter is in itself seldom consistent with health, either moral or physical.

The horses are carefully tended and separately stalled upon the farm, the scene of their labours; the human workman is dismissed in the cold and rain to a dreary trudge to his far distant home.

Even when the proprietor of a suitable spot for the erection of a factory or mill seizes his advantage to build such factory or mill, the increased rental is taken, but the hands are often compelled to seek their homes in some more lenient parish or in a neighbouring town. It appears to me that these harsh arrangements derive their origin from the present system of levying poor-rates, whereas, if the poor-rate was equalised throughout the whole country, the principle of selfish economy which now excludes the poor man from a home near his work would cease to operate, and the increased value of the land from the erection of cottages thereon would induce their sufficient construction in all desirable and suitable places.

This poor-rate question lies at the foundation of the inferior accommodation of our country cottage homes.

The mode in which the details of garden plots, drainage, water, sleeping-accommodation, ventilation, are to be arranged and secured, I do not propose to enter upon, my object is rather to occupy a small space in your *Journal* in treating of the second division of the subject:—"Healthy town homes for the labouring classes," and more particularly to direct the attention of the members of the Society to some laudable exertions which are in progress for accomplishing the great object, at rents intended to be fairly remunerative to the proprietors, yet not exceeding those now being paid for far inferior accommodation.

Town Homes. — *Investment should be commercially remunerative.*—It should be laid down as a fundamental principle that in all arrangements, buildings, or proposals for the class of homes we refer to, such returns to the capitalist as will induce the erection of whatever number of these tenements may be required, must be shown to be safely, readily, and permanently obtainable.

However desirable the outlay of money may be from generous or charitable motives, we may safely assert, in reference to the matter now under discussion, that—beyond its employment in the erection of buildings as an experiment, putting forth, or illustration of any system—it is worse than useless, because the principle of charity cannot be depended upon to adequately meet the vast requirements of the case, demand and supply on this plan holding no commercial relation or natural connection. Its management is expensive, and, worse than all, it must necessarily, to a less or greater degree, induce, among the occupiers of dwellings thus charitably constructed, the idea that they are receiving something for which they do not pay, in itself unpleasant to the right-minded, and injurious to self-reliance and independence of character.

Mr. Allen's Plan of constructing Healthy Dwellings for the Industrial Classes.—The originator and inventor of the system illustrated by the subjoined wood-cuts, Mr. Matthew Allen, of Worship-street, Shoreditch, London, bases his whole scheme upon the calculation that the amount now paid by the working classes for home accommodation will secure a satisfactory interest upon the capital invested.

The two pillars upon which Mr. Allen depends for the remunerative nature of his constructions are:—

1st. The extensive use of a peculiar material in lieu of the ordinary building materials.

2nd. The arrangement of his individual homes in the compound dwelling.

One of the great featnres in the construction of a block of buildings which many separate and independent families or persons are to inhabit, should be the adoption of all available means for the protection of the whole from fire, and for its isolation, should fire occur in one compartment. To secure this most important object, to effect a great saving in the cost, and to give a substantial, enduring character to the buildings, a new and peculiar combination of material is employed, possessing all the characteristics, and yet at less than one-third the cost of stone.

The combination is thus described in Mr. Allen's patent:—"My invention consists in obtaining and forming a new material for building purposes by the combination of cinders, slags, coke, culm, clinkers, or other calcined substances of similar character thereto, possessing an irregular, uneven or porous surface, with Portland or other cement, in the proportion of about one part thereof to about three parts of any of the other substances, the whole being mixed together with sufficient water to bring it to a requisite consistence, so as to enable it to be placed or poured into moulds for the purpose of giving it any desired shape or form. These moulds are to be faced with zinc or any other suitable metal which will prevent the adhesion of the material thereto while it is setting. This material is to be used for the making of walls, floors, roofs, steps, slabs, lintels, chimney-pieces, and the like, and these are to be strengthened, where necessary, by placing iron bars or ribs therein edgewise."

It is proposed to use moulded fire-places, window-cills, and stairs made of this material in the construction of buildings for the poor, and the floors are likewise to be composed of the same materials.

The following is the mode of proceeding in constructing a floor:—In the formation of floors flat iron bars are

placed edgewise across the room, at distances of about 24 inches, these are punched with holes, 24 inches apart, through which holes round iron rods are passed, and for an additional security, although the precaution may be considered entirely unnecessary, small pieces of iron rods, a quarter of an inch square, are placed across the round bars, at intervals of eight or ten inches. The size of the flat iron bars above mentioned would, of course, depend upon the length of bearing, say, for a fourteen feet bearing, iron half inch by three inches, and, for shorter bearings, the size would be diminished in proportion.

The mode of forming a floor is as follows:—Boards are placed on the under side, similar to a centre, by which means the space between the ironwork is enabled to be filled in to the level of the upper edges of the flat bars, thus forming a compact floor three inches in depth. The iron-work forming such floor, when filled in on all sides with the aforesaid material, becomes rigid, and the flat iron bars are thus prevented from bulging sidewise; they are capable of bearing almost any amount of weight.

By constructing the floors as above described, the strength of the building is greatly increased, as the iron-work may be continued through the party walls. The balcony may also be formed without the necessity of any support or bearing whatever in the front, at the same time being equally as substantial as if supported by columns. The floors formed with this material, although as strong and durable, are less than half the weight of stone, a very important point in the construction of all buildings. This system renders the use of timber almost entirely unnecessary in the main portions of the buildings, and only the internal fittings of the rooms need have any portions of wood used in their construction. Not only is the plan economical and safe, but the advantage in reference to the deadening of sound is considerable over any wooden flooring that might be adopted.

The second point upon which Mr. Allen relies for the success of his enterprise is the arrangement. By including many tenements in one block, and by constructing one external staircase for twenty lettings, great economy of wall and space is effected, and, there being no internal staircases, all the room within the walls is available for household accommodation.

It is not pretended that this plan is more advantageous than any other system of compound dwellings, except so far as the saving of space by his mode of arranging the rooms and staircases may be superior to any other scheme. Having regard to the national love of domesticity, and to secure complete privacy and thorough control by the tenant over the whole of the rooms he rents, each letting is so arranged as to form a perfectly separate and independent tenement, containing, in itself, all necessary appliances and conveniences for securing those comforts which the humblest Englishman is desirous of possessing, and clothed in the idea of home. Privacy is secured, and the character of a separate house maintained by the system of—1. Outside general staircase. 2. Separate private door to each occupation. 3. Providing each set of rooms with its own water-closet, coal compartment, and wash-house with copper. 4. The power of completely shutting up or thoroughly opening and ventilating the separate lettings at the will of the tenant, thus giving perfect internal control to the occupier.

The method of constructing the outside staircase is thus described in Mr. Allen's patent:—

"I propose to construct buildings in a new and improved manner, by economising the spaces which the staircases usually occupy, and to render them fireproof by dividing or insulating the staircases from the building of which they form a part. This I propose to accomplish by arranging the stairs (which are to be made of incombustible materials) in a recess formed in the outer wall of a building, which recess is to extend from the foundation to the roof, and have no opening whatever on its inner side, but is to be provided, where necessary, with openings or doorways on its outer face leading to balconies (which are also to be formed of incombustible materials), fixed at the level of, and giving access to, each of the floors or flats of the building. By means of this arrangement of staircase and balconies, each floor or flat will be rendered totally distinct from, and independent of, that one below or above it, so far as regards any internal communication therewith or therefrom."

Reference to the ground plan, sent with this *Journal*, will show the position of this external public staircase and the private entrance doors to each letting, marked E D, E D. Privacy is further secured by the mode in which the windows are arranged. So essential has Mr. Allen deemed this point of privacy in connection with the power of ventilation, that he has even sacrificed the symmetry of some of the rooms to secure this object. From an inspection of the dotted lines (the arrows show the course of a current of air) on the plan, it will be obvious that each tenant may cause a thorough current of air to enter one room, or pass through his set of apartments, without interfering in any way with his fellow occupants.

Another important point with Mr. Allen has been so to arrange the windows, that the outlook of one tenant shall not be in the direction of his neighbour's apartments. Although built in a block, the arrangement of separate waterclosets, coal apartments, wash-house and copper (see plan) for each tenancy secures the essentials of a private home. The roof is made flat, and being accessible by the external staircase, is intended to be used for drying the washed clothes.

The question in relation to the Peabody Grant.—This is not the occasion to go into details, but it may be fitting to enumerate certain points which seem to bear intimate relation to the subject.

1. The town workman, wherever he resides, can, and will, only afford, within very narrow limits of variation, a certain amount of his wages for rent. The rental, therefore, of a compound home is practically a fixed quantity, wherever the situation of the dwelling may be, in this respect totally differing from the rental of the better class of houses, which depends upon two elements, locality and cost, and not upon the income of the occupiers.

2. In cities and large towns ground space is too valuable to give proper area for the individual homes of the working classes. They must, therefore, either live afar or be inconveniently and unwholesomely crowded, or the desirable accommodation must be obtained by building upwards, and even with the greatest practicable elevation, a hive for the industrious could not possibly be constructed in many situations, on account of the high ground rent.

3. The cost of building, however low it may be brought by Mr. Allen's plan, or any other, may be considered as uniform throughout the same city or neighbourhood.

4. Out of a given rental, which might be fairly shown to be receivable from a block of homes, a certain proportion cannot be exceeded for ground rent, if the remainder rental is to be ample enough to induce a capitalist to build the houses.

5. If, therefore, the rental and cost of erection are fixed quantities, it follows that the ground rent may, in many cases, be the turning point of profit or failure.

6. A ground rent of a certain per-centage of the gross rental might be endurable, and yet the buildings be profitable as an investment, whereas a slightly increased rate might be sufficient discouragement to turn the scale against the speculation.

7. In what mode, then, could the Peabody Gift, which is understood to be intended for the benefit of the working classes of London, be made legitimately available in aid of this cause?

8. Assuming that a ground-rent should pay 4 per cent. upon the purchase, if the trustees should invest a portion of the gift in land, they would be entitled to expect an income of 4 per cent. on their outlay, but if, in doing so, they should select spots suitable for the erection of such homes as have been described, and would be willing to accept 2 per cent. instead of 4 per cent.—the 2 per cent.

lost going in easement of the ground rent, payable by the builder—the advantage to the working classes would be the erection of homes in many healthy, advantageous positions, in which they would otherwise never be built.

9. This would seem to be a proper mode of applying a portion, at least, of the fund, without detriment to the character of the working-man;—there would be no charity apparent—he paying the same rental—and the builder expending the same amount of money in the erection of the homes; only, but most importantly, suitable situations which are not now obtainable might then be rendered available.

10. The trustees should not, under any circumstances, go into the building question; that should be left to private persons, by whom it would be so much better managed; their assistance should take the form of purchasing, and, and having reference to the special object of their trust, accepting a lower ground rent than they might otherwise reasonably demand and obtain.

Doubtless the spirited promoter of this project, with whom this idea originated, will bring the matter in an adequate manner under the notice of the trustees.

Gentlemen who may take an interest in the question now discussed have an opportunity of inspecting, while in course of construction, such a group of homes as I have described.

The block represented in the plan forwarded with this *Journal*, and also illustrated below, are nearly finished building, by Mr. Allen, in Mark-street, Paul-street, Finsbury, for Mr. S. H. Waterlow, who has set the praiseworthy example of testing the interesting problem whether it is not possible to provide on a sound commercial basis, a healthy decent home for the labouring man at a moderate rent.

While writing the preceding remarks, the letter of the Paris correspondent of the *Times*, from which the following is an extract, came under my notice.

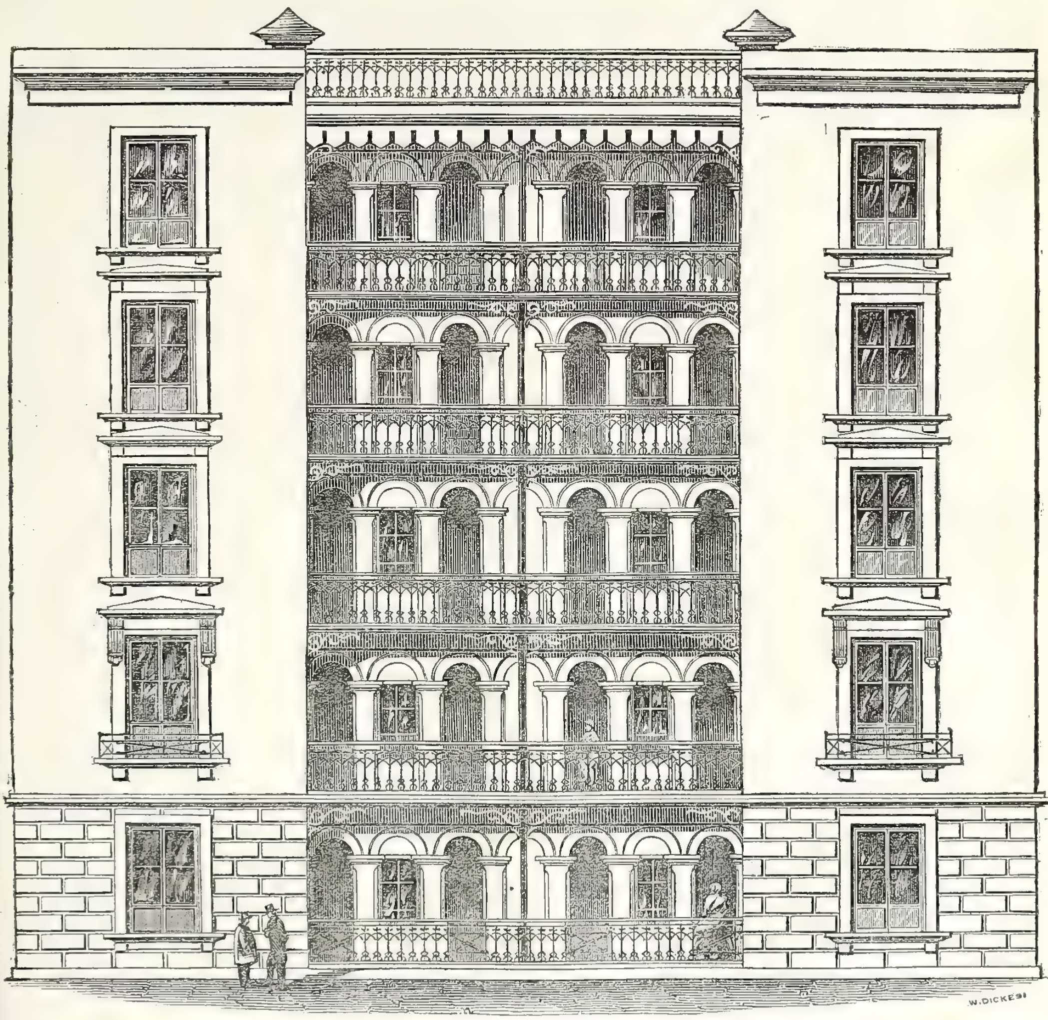
I subjoin it for the purpose of showing from what an entirely different point the same or at least an analogous subject is viewed and taken up by the two nations, although the French mode seems in its general features very much to resemble the arrangement of our Sailors' Homes.

I am, &c.,

WILLIAM STONES.

(FROM OUR OWN CORRESPONDENT.)

The Government has determined to accomplish a reform in the dwellings of the operative classes in Paris, and is about to commence by the construction of a *cite modele* on the Boule-



HEALTHY DWELLINGS FOR THE INDUSTRIAL CLASSES (REGISTERED), DESIGNED BY M. ALLEN, BUILDER, FOR MR. SYDNEY H. WATERLOW, NOW IN COURSE OF ERECTION IN MARK STREET, FINSBURY.

vard Mazas for unmarried workmen. The situation is well chosen, being in the centre of the manufacturing quarter of Paris. The proposed building is to be five stories high, and each floor is to be divided into smaller rooms completely separated, and to be approached by a spacious staircase. The ground floor is to be appropriated to a reception room or common hall, open to all the lodgers, to a restaurant or dining room, an office for the director, and an apartment for the house porter. The plan has been already prepared by the Government architect, and it shows that every room is to be well lighted, well ventilated in summer, and heated in winter. The common hall is likewise to be well heated which will be a great advantage to the workmen, who can thus pass their evenings there in place of spending their time and money in a wine-shop. The first stone of this building, which will confer so many advantages on the workmen who have assisted in the decoration of Paris, will shortly be laid.

Home Correspondence.

ELEMENTARY EXAMINATIONS.

Sir,—No time should now be lost in preparing for the Elementary Examinations, according to the scheme of the Central Committee of Educational Unions. The experience last time in Yorkshire was, that many of the successful seniors became candidates for the certificates of the Society of Arts, and, no doubt, such a result will be largely increased on the next occasion. I annex a copy of the circular which is being forwarded to every Institute in the Yorkshire Union.

BARNETT BLAKE.

"WEST RIDING EDUCATIONAL BOARD for Conducting the Universities' Examinations, the Society of Arts' Examinations, Elementary Examinations, Science-Class Examinations, &c.

"Dear Sir,—With this you will receive some bills, announcing the Elementary Examinations, and Society of Arts' Examinations, which please exhibit in the most conspicuous places in your institute, so as to make them as public as possible.

"The Elementary Examinations may be held in your own place, requiring only the supervision of one or more responsible persons to certify that the written answers to the questions were the sole work of the candidates.

"All the members of your Institute are eligible to be candidates, either junior or senior, without reference to age or sex.

"Those who pass as seniors, if sixteen years of age, may be candidates at the Society of Arts' Examinations without any Preliminary Examination.

"Should any of your members desire to be candidates, please to send us their names and ages, and say whether they are juniors or seniors, before the 26th of January, and the required number of papers of questions will be sent to you in due time. Send also the names of those who will superintend the Examinations.

"Each candidate must pay a fee of sixpence for the cost of papers and certificates. The latter will be headed, 'In Connection with the Society of Arts.'

"Should you determine to form a Local Committee for conducting the Society of Arts' Examinations in your Institute, please to send us their names, addresses, and occupations before the 1st of January next. If your Institute is not in connection with the Society of Arts, and has an income not exceeding £75 a year, your Local Board will be considered a branch of the Yorkshire Union of Mechanics' Institutes, and the candidates for the Society of Arts' Examination must pay a fee of 2s. 6d. each. We are, dear Sir, yours truly,

"BARNETT BLAKE, } Hon. Secs.
"JOHN PICKERING, }

"Mechanics' Institution, Leeds."

Proceedings of Institutions.

Barnsley Mechanics' Institute and Literary Society.—The Committee express their regret that the number of members for the last quarter shows a decrease of 30 upon the corresponding period of last year. They are unable to assign a satisfactory reason for this falling off, because, although the badness of trade may have had some influence, yet the increasing numbers of our population, and the more widely diffused knowledge of the benefits arising from membership with this Institute, ought to have counteracted the effects of commercial depression. Notwithstanding the diminished numbers, the receipts from subscriptions are slightly in excess of those for the preceding year. This anomaly arises from the persevering diligence of the gentleman who now collects the subscriptions at a given per centage for his labour, as contrasted with the irregular and fitful exertions of the voluntary canvassers for the previous years. The library department has received special attention during the past year. The nucleus of a reference library has been formed and placed in the book-case in the news-room. The circulating library has received an addition of 178 volumes, and a complete catalogue of all the books has been prepared, printed, and placed in the hands of the members. The issues from the library, as compared with those of the previous year, show an increase of 1,201 in books, and 315 in periodicals. The total number of books in the library now amounts to 1,784. The news-room has been well patronised. Both newspapers and periodicals have been chosen with great care, and the members, generally, seem pleased with the selection made. The course of lectures has afforded considerable gratification, not only to the members, but also to the public at large. Last year the expenses connected with the lectures, exclusive of any charge for the hall, amounted to £36 12s. 3d., while the receipts from the sale of season tickets, and the money paid at the doors, amounted to £41 14s. 3d. When the members of the Institute remember that they are admitted free to all the lectures, whether costly or not, they will be gratified to hear that, by the present mode of arrangement, this privilege is secured without the funds of the Institute suffering any serious loss. If the net loss upon the hall account should be charged to the lectures, then, at a cost of about two guineas per lecture, the members will have been supplied with an admirable course of instruction and amusement, and will have had ample return for the amount of their subscriptions. The balance sheet for last year shows that the receipts have been £187 4s. 9d.; the balance of cash at the bank is £29 11s. 5d., being £27 3s. 7d. less than the Institute possessed last year. The chief cause of this deficiency is to be found in the lettings of the hall, which have realised £22 3s. 9d. less than they did in the former year. Throughout the past year trade has generally suffered such a severe depression, as fully to account for this unwelcome result. The actual net receipts of income from all sources are £15 8s. 9d. in excess of the previous year. The net expenditure, excluding the hall department, is £41 7s. more than in the former year. Of this sum, £22 3s. 10s. represents the extra amount of money spent in the purchase of books for the library. The following lectures were delivered in the season of 1861-62:—On "William Cobbett," by George Dawson, M.A.; on the "Power of Littles," by the Rev. S. Dyson, of Idle; on "Martin Chuzzlewit," by George Grossmith, Esq.; on "The Atmosphere," by Claude Wheelhouse, Esq., of Leeds; on "The Life, Times, and Writings of Lord Macaulay," by the Rev. W. E. Littlewood, M.A.; on "Ireland in 1861," by the Rev. Dr. Gatty, Vicar of Ecclesfield; on "The Beautiful in Nature and in Morals," by the Rev. G. Mather, of Leeds; on "The Romance of the Bourbon Family," by Dr. Daniel, of London; on "The Domestic Life of the Buonaparte Family," by Mrs. C. L. Balfour; on "The Sublime in Nature and in Morals," by the Rev. G. Mather, of Leeds; a musical entertainment, by A. Ramsden, Esq., of London; a dramatic reading, by Walter Montgomery, Esq.

Hitchin Mechanics' Institution and Public Library.—The annual meeting of the above institution

was held at the Town Hall, on Wednesday, the 22nd of October last, the Rev. Lewis Hensley, M.A., President, in the chair, who opened the proceedings of the meeting by remarking that it was always pleasant to meet the members and friends of the Institution, but that feeling was much enhanced by knowing that the beautiful room in which they then met was entirely free from debt, and really their own. He then called upon Mr. Pollard, the Treasurer (in the absence of the Secretary), to read the report, in which the Committee congratulated the members upon its continued prosperity and usefulness. Since their last report was presented, they have been enabled (through the liberality of friends and members) to liquidate the entire debt that remained upon the library. The cost of the building, with all expenses connected with it, has amounted to £498 16s 3½d. The entries in the librarian's book are again most satifactory. The library was closed for three months last year, for the arrangement and classification of the books. Upon comparing the same nine months of this year with the last, there is an increase of 964 entries. The increase of the entire twelve months amounts to 2,561 entries. The total number entered during the twelve months is 6,196. The Committee acknowledge with many thanks the handsome and valuable donation of an excellent copy of Clutterbuck's "History of Hertfordshire," in 3 vols., folio, by friends of the Institution, whose names are inscribed in the 1st volume; and also a copy of the "History of the British and Foreign Bible Society," in 2 vols., presented by Mr. John Thompson. Twelve lectures were delivered during the season, which were attended by 2,569 persons, making an average attendance of 214 to each lecture, showing an improvement in comparison with last year, when the average attendance amounted to 173 each evening. The cost of the lectures has been £40 10s. 11d., and the receipts at them £33 11s. 2d., showing a deficiency of £6 19s. 9d. Last year the loss sustained by the lectures amounted to £9 13s. 4d. The Committee beg to return their sincere thanks to those gentlemen who have so kindly aided them in this important and valuable service. They have also great pleasure in reporting the success of three of the members who have obtained certificates of merit, of the first and second classes, at the examination of the Society of Arts; one of them proved the best in his class, and obtained the first prize of £5. All who feel an interest in this subject are directed to the large programme of examinations for 1863, which is suspended in the library and reading-room. The Treasurer's report shows an income of £144 10s. 7½d., and an expenditure of £143 5s. 1½d., leaving a balance of £1 5s. 6d. in hand. After the adoption of the report, the members proceeded to the election of the officers for the ensuing year. The Rev. Lewis Hensley was elected president, Mr. J. Pollard, treasurer, and Mr. G. Latchmore, secretary. The President then proceeded to give the certificates of merit from the Society of Arts to the successful candidates, expressing a hope that the success of this year would stimulate many other members to follow so good an example, and devote themselves to self-improvement. A long discussion followed upon the propriety of raising the price of admission to the lectures, as they have shown a loss in the balance-sheet for the past three years, but it was finally decided that it was most prudent not to disturb the present charges, but to request the members to support the Committee by attending the lectures still more regularly than they have done heretofore. The proceedings terminated with a vote of thanks to the Chairman.

PRESTON INSTITUTION FOR THE DIFFUSION OF KNOWLEDGE.—The thirty-fourth annual report, read at the meeting of the members held in the theatre of the Institution, on the 7th October, John Goodair, Esq., President, in the chair, states that its career continues to be essentially useful, but the unprecedented gloom which has prevailed in Preston and the manufacturing districts generally has not been without its influence on the resources of the Institution. On this account, the movement for the extinction of the debt on the building, which last year made so auspicious a commencement, has been in abeyance. The debt, however, has been reduced from £400 13s. 3d. to £360 13s. 3d., by the amount of one year's rent of Dr. Shepherd's library, which, acting upon the practice of their predecessors, the council have appointed to the credit of the building fund. The number of subscribers during the year has been 513, being twenty less than in the previous year, and forty nine fewer than in 1859—60. The council regret that they are not able to make a more favourable report in this particular, the advantages offered by the Institution, as compared with the amount of subscription, being, they believe, second to none in the county. They have the pleasure, however, to state that, notwithstanding this drawbabk, the operations of the Institution generally are in a state of healthy activity. The number of issues of volumes for reading, last year, was 15,076, being a slight increase on the number of the preceding year. As a matter of literary statistics, the following analysis of works circulated may be of interest:—Arts and sciences, 1,715; history, 586; voyages and travels, 1,423; biography, 1,038; poetry and drama, 530; tales and novels, 7,268; miscellaneous literature, including magazines, 2,516; total, 15,076. The number of volumes added to the library during the year has been 194—by purchase 188, and by donation 6. The number of volumes now in the library is 6,760, including some of the most valuable works in every department of literature. The council felt that they would scarcely be justified in devoting any portion of the slender resources of the Institution to the engagement of lecturers. For some seasons past the attendance at the lectures has not been very encouraging, although they have been a heavy item of expense. The council considered also that as respects educational results, the objects of the Institution would be even better carried out by devoting the money to the enrichment of the library. On the general account, the balance against the Institution is larger by £20 2s. 6d. than last year. This is owing mainly to the receipts from the letting of the lecture theatre having been so very small as compared with previous years. Until there be a revival in the trade of the district, the council cannot hope to receive much revenue from this source. The classes have been well attended, and their working, on the whole, has been satisfactory to the council. The operations of the Penny Bank have thoroughly justified its establishment. As might have been expected, however, the depressed state of trade has caused a large withdrawal of deposits. The annual soirée was held in December last, and resulted in a small balance in favour of the Institution. In the third annual report of the School of Art the Committee express themselves highly gratified with the condition of the school. The gloom now spread over the cotton district has, as might be expected, to some extent influenced the numbers of the pupils, but very considerable progress has during the last year been made in the studies prosecuted, which, in some instances, are of an advanced character. The numbers attending the various classes are as follow:—Young ladies, 10; ladies, 24; school boys, 11; pupil teachers (male and female), 32; artisans, 49; total, 126. These numbers show a slight falling off compared with last year's report, but not to a greater extent than might have been expected from the cause above referred to. The decrease in the pupil teachers' class is owing also to some changes recently made by the Educational Committee of the Privy Council in their regulations in reference to the public schools, and these combined causes account for the reduction from 1,541 to 900 in the number of pupils in the public schools receiving instruction from the art teachers. It is hoped that with the return of better times the classes will be raised to at least their former numbers. Mr. Gilbert continues to hold the office of head master with great advantage to the school, and the duties of pupil teachers have been very satisfactorily

discharged by Mr. William Duckett, and Miss Winifred Duckett, who succeeded Mr. Langley on his resignation at Christmas last. The examination of the school was conducted in June last, by Mr. S. A. Hart, R.A. 130 of the pupils attending the classes meeting at the school, and 124 of the pupils from the public schools, were present at the examination. Of the former, 15 obtained medals, 5 honourable mention, 13 second grade prizes, 13 certificate cards, and 7 first grade prizes. Of the pupils from the public schools, 1 obtained a second grade prize, 2 certificate cards, and 35 first grade prizes. Four pupils of the school obtained prize studentships, entitling the holder to free admission to the classes for the following year, and three who obtained such studentships at the previous examination this year obtained renewals. Some of the productions of the pupils were works of very considerable merit, and the result of the examination was satisfactory, showing a very general state of proficiency throughout the school, and exhibiting a very marked advance in the nature of the studies as compared with the previous examination. During the past year no efforts have been made to remove the debt from the school. The committee have abstained from appealing to the public for subscriptions, believing that, from the depression in trade now existing in the town, and the distress consequently prevailing on all sides, such an appeal would have been inopportune. The committee, however, believe that, under other circumstances, little difficulty will be experienced in relieving the school from the iucumbrance now weighing upon it.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...British Architects, 8.
Medical, 8½. Dr. Gibb, "Illustrations of the practical application of the Laryngoscope."
R. Asiatic, 3.

Tues. ...Civil Engineers, 8. Annual General Meeting.
Statistical, 8. Mr. James S. Hammick, "Recent Population Statistics of the British Colonies and Dependencies."
Pathological, 8.
Ethnological, 8.

Wed. ...Society of Arts, 8. Mr. Robert Hunt, F.R.S., "On the Mines and Minerals of the United Kingdom."
Geological, 8.
London Institution, 7.

Thurs...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. 1. Mr. A. H. Church, B.A., "On the form of the *Vascular fasciculi* in certain British Ferns." 2. Dr. J. D. Hooker, "Memoir on *Welwitschia*."
Chemical, 8.
Numismatic, 7.
Philological, 8.
Royal Society Club, 6.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette December 5th*, 1862.]

Dated 24th July, 1862.

2100. J. Leetch, St. Marylebone, and B. Mathew, St. James's, Middlesex—New and improved methods of protecting the surfaces of iron or other metal work from oxidation, incrustations, or accumulations of any kind, more especially in the cases of ships' bottoms, steam boilers, and machinery.

Dated 30th October, 1862.

2926. H. Eastwood, Elland, Yorkshire—Imp. in boilers and furnaces.

Dated 1st November, 1862.

2957. G. Haseltine, 100, Fleet-street—Imp. in coffins or burial cases. (A com.)

Dated 4th November, 1862.

2984. R. A. Brooman, 166, Fleet street—Imp. in the manufacture of fringes, and in machinery employed therein. (A com.)

Dated 10th November, 1862.

3024. G. H. Sanborn, 99, Cheapside—An improved wringing machine.

Dated 13th November, 1862.

3056. T. C. Eastwood and J. Eastwood, jun., Bradford—Imp. in machinery or apparatus for combing wool or other fibrous substances.

Dated 15th November, 1862.

3074. L. Croc, Aubusson, France—An improved ink to be used for the purposes of electric telegraphic printing or marking.
3076. J. Rimmer, Liverpool—Imp. in hansom cabs.
3080. H. B. Whitburn, Orrell Colliery, Lancashire—An improved method of purifying sand to be used in the manufacture of glass, and for other purposes where silica is used.

Dated 17th November, 1862.

3090. C. Littleboy, Straffan, Ireland—Imp. in implements for cultivating land.

Dated 18th November, 1862.

3092. J. Raphael, Upper Fountain-place, City-road—Imp. in umbrella, parasol, sunshade, and walking sticks.
3094. P. H. Klein, Paris—Machinery for turning or shaping metals or other substances.

Dated 21st November, 1862.

3126. C. Hadfield and W. A. Attkins, Hadfield, Derbyshire—Imp. in compressing or dressing bricks and tiles and other materials, and in machinery or apparatus to be employed for such purposes.
3128. J. R. Napier and W. J. M. Rankine, Glasgow—Imp. in boilers, and valvular mechanism for steam engines.
3130. D. Saul and M. Morris, Swinton, near Manchester—Imp. in the manufacture of crinoline skirts, and in the apparatus employed therein.
3132. T. Walker, Birmingham—Imp. in utilising sewage matters, and in the means or apparatus employed therein, part of which imp. is also applicable to raising and forcing other fluids.
3134. R. Swinburne, South Shields—Imp. in the manufacture of soda.
3136. J. Taylor, jun., Christchurch-road, Streatham, Surrey—Imp. in the manufacture of tiles or moulded blocks for building purposes.
3138. S. Deacon, Alma-street, New North-road, and C. Deacon, Rushton-street, St. John's-road—Imp. in tops, caps, and windguards for chimneys, and in apparatus for cleaning the same.

Dated 22nd November, 1862.

3140. W. E. Gedge, 11, Wellington-street, Strand—An improved elliptical compass. (A com.)
3142. M. Mishores, Newcastle-street, Whitechapel—Imp. in the construction of handles for umbrella, parasol, or other like sticks from soft canes.
3144. C. Powell, Birmingham—Imp. in watches and other timekeepers.
3146. A. V. Newton, 66, Chancery-lane—Imp. in machinery for cutting corks. (A com.)

Dated 24th November, 1862.

3150. W. Clark, 53, Chancery lane—Imp. in the means of obtaining vacuum or partial vacuum, as applied in the manufacture of paper. (A com.)
3154. E. Leigh, Manchester—Imp. in cotton gins.
3156. N. J. Amies, Manchester—An improved fabric to be employed as a substitute for elastic woven or "braided" webs, and imp. in the method of manufacturing the same.

PATENTS SEALED.

[*From Gazette, December 5th*, 1862.]

December 5th.
1714. J. Lovegrove.
1721. F. Giachosa.
1726. J. Kinlock & T. Edmeston.
1729. G. T. Jourdain.
1730. H. C. Jennings.
1734. J. Shand.
1738. W. Holland.
1749. A. A. Serenard.
1759. J. H. Glew.
1811. E. J. Davis.
1818. J. Bedford.
1840. J. Lawson.
1859. M. A. F. Mennons.
1913. T. Parker.
1938. G. H. Birkbeck.
2633. H. Hutchinson.

[*From Gazette, December 9th*, 1862.]

December 9th.
1736. J. D. Wake.
1737. H. Bland.
1739. W. Crook.
1743. B. W. Gerland.
1745. J. Hetherington.
1746. J. Ingham and W. P. Wood.
1752. A. Salviati.
1753. B. George.
1766. J. Robinson.
1768. T. Williams and H. Cox.
1769. J. Sawyer & G. Padgham.
1773. W. Bouch.
1774. R. A. Brooman.
1775. W. Wighton.
1779. J. F. Allan.
1782. W. J. Curtis.
1790. J. Nield and T. A. Nield.
1834. S. Holman.
1841. E. Edmonds.
1847. W. Barr.
1867. E. H. Huch and F. J. Windhausen.
2167. W. Norman.
2492. G. T. Bousfield.
2494. G. T. Bousfield.
2620. P. Wright.
2789. E. A. Cowper.
2811. H. Ledger and B. Williamson.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

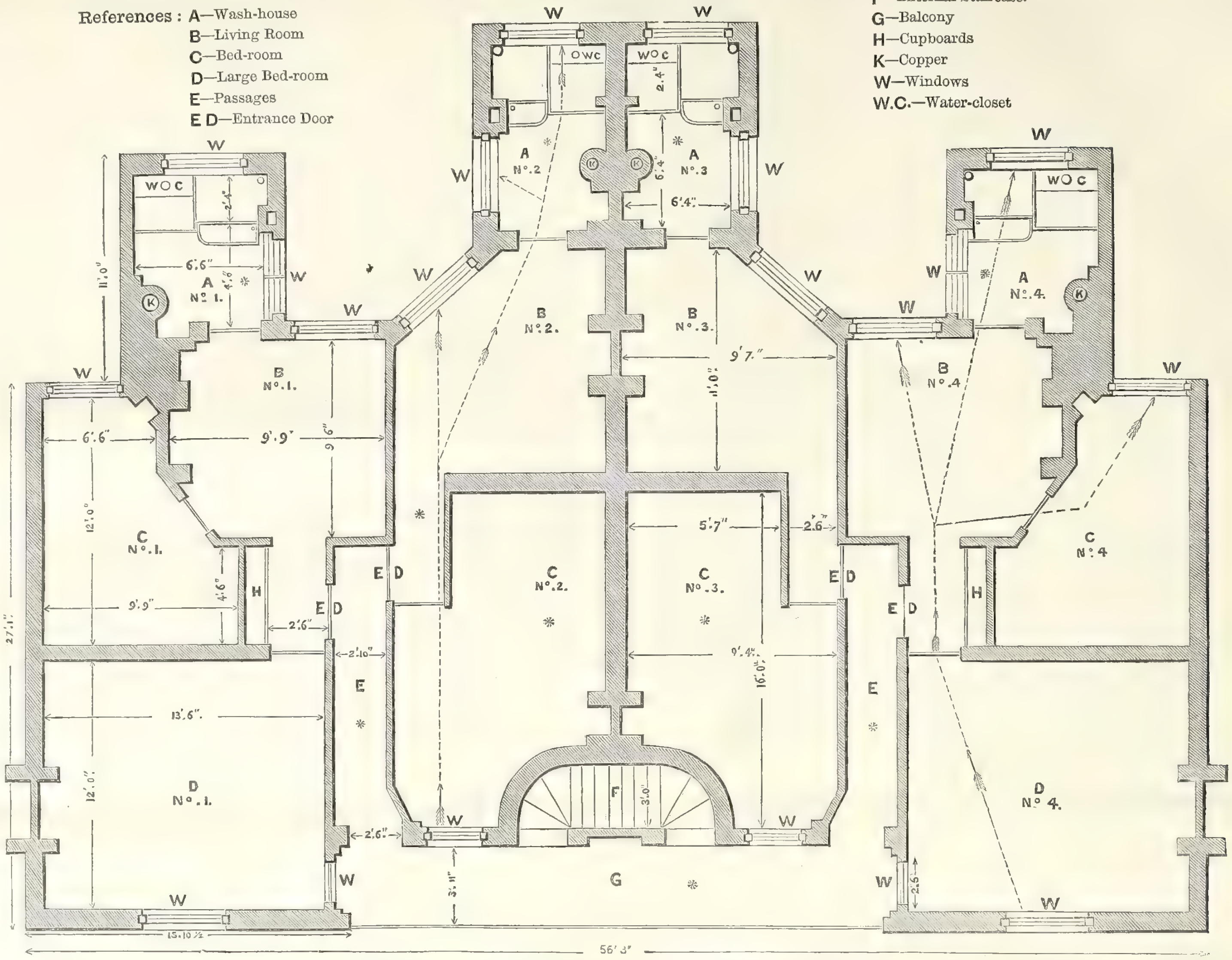
[*From Gazette, December 9th*, 1862.]

December 1st.
2717. C. A. Fournier.
2727. W. Betts.
2798. W. Betts.
December 2nd.
2745. E. A. Curley.
2767. J. Anderson.
2779. J. G. N. Alleyne.
December 4th.
2748. J. Hawkins & C. Hawkins.
4758. C. Sells.
2774. J. Combe.
2792. W. Boaler.
2810. S. W. Campain.
2918. A. V. Newton.
December 6th.
2789. J. Macintosh.
2790. J. Macintosh.
2791. J. Macintosh.
2834. W. Hulse.

Ground Plan of a Flat, Nos. 1 and 4 having Four Rooms, and Nos. 2 and 3 Three Rooms in each Letting.

The stars indicate that the floors are constructed of Allen's patent fireproof material, of which also the staircases and roofs are composed.

References : A—Wash-house
B—Living Room
C—Bed-room
D—Large Bed-room
E—Passages
E D—Entrance Door
F—External Staircase.
G—Balcony
H—Cupboards
K—Copper
W—Windows
W.C.—Water-closet



HEALTHY DWELLINGS FOR THE INDUSTRIAL CLASSES (Registered).

Designed by M. Allen, Builder, for Mr. Sydney H. Waterlow.

NOW IN COURSE OF ERECTION IN MARK STREET, FINSBURY.

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Journal of the Society of Arts.

FRIDAY, DECEMBER 19, 1862.

INTERNATIONAL EXHIBITION OF 1862.

Her Majesty's Commissioners for the Exhibition of 1862 have addressed the following letter to General Knollys, to be laid before His Royal Highness the Prince of Wales :—

Exhibition Building, South Kensington, December 16.

Sir,—I am directed by her Majesty's Commissioners to request that you will do them the favour to submit to his Royal Highness the Prince of Wales an expression of their sense of the gracious intention, communicated to them in the month of October last, of his Royal Highness's readiness to mark his interest in the success of an enterprise which owed its origin to his illustrious and distinguished father, by distributing, at a State Ceremonial, the prizes which have been awarded by the juries. Such a mark of his Royal Highness's personal interest in the Exhibition would have been highly appreciated by everyone connected with it. Although the number of successful exhibitors would have made it impossible for them individually to receive the rewards of their skill and industry from the hands of his Royal Highness, the value of these rewards would have been greatly enhanced by the fact that his Royal Highness had presided on the occasion of their distribution. It is, therefore, with great regret that her Majesty's Commissioners find, on consulting various competent authorities, that it would be practically impossible, for a single occasion, to carry out their original design of warming and lighting the building. The proposed distribution of the prizes cannot, with due regard to the interests of the foreign commissioners, possibly be postponed beyond the end of January. Under these circumstances, her Majesty's Commissioners have come to the conclusion that they would not be justified in inviting his Royal Highness to preside at a ceremony, the success of which would have to depend in a great measure upon the doubtful chance of a fine day occurring in the depth of winter; neither would they be willing to expose to the probable chance of disappointment from the accidents of rain, snow, or fog, the many distinguished foreigners and British exhibitors who would come from great distances to be present on the occasion. Her Majesty's Commissioners trust that His Royal Highness will not disapprove of the decision at which they have most reluctantly arrived.—I have the honour to be, &c.,

F. R. SANDFORD, Secretary.

Lieut.-General Knollys.

NOTICE TO MEMBERS AND INSTITUTIONS.

Exhibition Catalogues.

Her Majesty's Commissioners for the International Exhibition of 1862 have placed at the disposal of the Council, for distribution to the Members of the Society and Members of the Institutions in Union, copies of the Industrial and Fine Art Catalogues.

Members of the Society desiring to have copies of each of these Catalogues may have them on application, either personally or by an authorised agent, at the Society's House.

Secretaries of Institutions in Union may have a limited number of copies placed at their disposal for distribution amongst their Members, on making a similar application, specifying in all cases the number required.

General Index.

A general Index to the first ten volumes of the *Journal* will shortly be published, which may be bound with the last volume. Members who desire to have copies (which will be supplied *gratis*) are requested to apply to the Secretary as early as possible, in order that a sufficient number may be printed.

EXAMINATIONS, 1863.—NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The attention of Secretaries of Institutions and Local Educational Boards is specially called to the following extract from the programme of examinations for 1863:—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1863. In some cases the Local Educational Boards comprise such large districts, that, for the convenience of the Candidates, Branch Local Boards have to be formed within the districts. Whenever this is the case, the names and addresses of the members, both of District Board and of its Branch Boards must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

THE SOCIETY'S EXAMINATIONS AND GOVERNMENT APPOINTMENTS.

The Council are happy to announce that Mr. John Gershom Greenhough, of the Bradford Mechanics' Institution, who obtained the Prince Consort's prize of twenty-five guineas at the Society's Examinations in May last, has been successful in a recent examination, held by the Civil Service Commissioners, for clerkships in the Privy Council Office, his name standing second in the list of candidates. Mr. Greenhough was nominated to this competition by the Council of the Society, Lord Granville having kindly enabled them to afford him this opportunity of entering the Civil Service.

FIFTH ORDINARY MEETING.

WEDNESDAY, DECEMBER 17, 1862.

The Fifth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 17th inst., Sir Thomas Phillips, F.G.S., Chairman of the Council, in the chair.

The following candidates were proposed for election as members of the Society :—

Ell, George	366 & 368, Euston-road, N.W.
Home, D. Milne, (Royal Horse Guards)	Hyde-park Barracks, W.
Jones, James W.	86, Piccadilly, W., and 28, Mark-lane, E.C.
Hewlett, Anthony Hare	Burlington arcade, W.
Klaftenberger, Charles I.	157, Regent-street, W.
Lainson, George	1, Henry-place, Clapham, S.
Macadam, Stevenson, Ph.D.	Edinburgh.
Martin, William Henry	64 & 65, Burlington-arcade, W.
Matthews, Frank, jun.	Driffield, Yorkshire.
Nash, John Tullock	9, St. Stephen's-road, Bayswater, W.
Pease, Joseph Whitwell.	Woodlands, Darlington.
Rosser, S. Egan	Percy Chambers, Northumberland-st., Strand, W.C.
Sands, Thos. C.	7, Bishopgate-street, Leeds.
Tucker, Prof. Raymond	Wellington College, Sandhurst.
Watkins, James	Grammar and Commercial School, Deptford, S.E.
Wiener, Charles	88, Ebury-street, Eaton-square, S.W.
Williams, George Joseph.	17, Cavendish-place, Cavendish-square, W.
Wise, Francis	Chandos Chambers, Buckingham-street, Adelphi, W.C.

AND AS HONORARY CORRESPONDING MEMBERS :—

Dammas, M.	Berlin.
Dietrich, M.	Berlin.
Steffeck, Professor	Berlin.

The following Candidates were balloted for and duly elected members of the Society :—

Attenborough, Richard	Whitley Grove, Reading.
Aubin, Charles	Guardian Works, Great Hampton-street, Wolverhampton.
Baylis, W. H.	69 Judd-street, Brunswick-square, W.C.
Bickley, William	7 Ludgate-street, E.C.
Birnstingl, Louis	230 Regent-street, W.
Bowron, James	Tees Glass Works, Stockton-on-Tees.
Boyd, James	91 New Bond-street, W.
Bradshaw, William	Meadow Iron Works, Mansfield.
Brockwell, Frederic H.	79 & 80 Leather-lane, E.C.
Cochrane, Adam L.	Galashiels, N.B.
Dix, Thomas	10 Amwell-street, Claremont-square, E.C.
Ebrall, Samuel	Canonbury-house, Kingsland, Shropshire.
Fraser, Edward John	26 Craven-st., Strand, W.C.
Frederickson, Johan Frederick	27 Finchley-road, St. John's Wood, N.W.
Godfroy, Edmond	30, Brewer-st., Golden sq. W.
Green, James	35, Upper Thames-st., E.C.
Hack, Thomas	West Middlesex Waterworks, Hammersmith, W.
Hammer, George M.	44, Harrington-street, Hampstead-road, N W.
Hook, Charles Townsend	Snodland, Kent.
Hudson, Alfred	Cranbrook.
Johnson, Jabez	Pennington Hall, near Manchester.
McLaren, David S.	13, Bute-st., Brompton, S.W.
Scarth, John	96, Westbourne-terrace, W.
Warne, Stannard	4, Bruton-street, Bond-st., W.
Warrington, Wm.	35, Connaught-terrace, W.

The following Institutions have been received into Union since the last announcement:—

Ipswich, Working Men's College.
Sydenham and Forest Hill Institute.

The Paper read was—

ON THE MINES, MINERALS, AND MINERS OF THE UNITED KINGDOM.

BY ROBT. HUNT, F.R.S., KEEPER OF MINING RECORDS, GOVERNMENT SCHOOL OF MINES.

The mineral treasures of the United Kingdom are in every way remarkable. Whether we examine the subject historically, commercially, or from a scientific point of view, it is equally full of that real interest which ever surrounds those things which minister directly to the necessities and luxuries of human existence. For more than two thousand years we have been a mining people. The history of British mining is a remarkable exemplification of the constantly renewing energies of man, applied without any other guiding light than that of undisciplined experience, to the discovery of mineral wealth. It shows us that each age has, in its own particular way, been digging into the earth—that in so digging some knowledge, curious and valuable, has been acquired; and it instructs us further that the miner died—that his experience perished with him—and that the son had to commence where his father began, and that, unfortunately, imbued "by what it works in, like the dyer's hand," he held his acquired knowledge, as too sacred a thing to endure the light, and bequeathed darkness and mystery to his child. In this way we have laboured, producing, from the limited area occupied by the British Isles, a larger amount of metallic wealth than has been yielded by all the world beside. This is due to the industry of the people—to that irrepressible energy, which, like a mighty pulse, has varied in intensity of action, but which has never ceased to beat and quicken the life-labour of England's sons.

Back in those dark days, where the guiding light of History has not penetrated—where we are aided alone by the uncertain flickerings of wild traditions—British mining has its origin. The Tyrian navigator, in all probability, reached these shores, and traded with our forefathers for the tin which was employed in the manufacture of those bronzes which were so prized by the ancient monarchies of the East, and which now are prized as antiquities in our own museums. It is true this is doubted by one of our high authorities. But Sir George Cornewall Lewis, in his "Astronomy of the Ancients," has only opened a door which he has found himself unable to close, and he has left the subject of our commerce with the Phœnicians in a sadly disturbed and most unsatisfactory state. The evidences of mining, by that people whom we usually distinguish as the ancient Britons, it must be admitted, are obscure. I have, however, pursued the enquiry for more than twenty years, and have never lost an opportunity of examining any work, assigned by tradition to the pre-Roman period, and I feel assured of the existence of the rude works of a rude people, to which I can now point as satisfactorily indicating the labours of our British forefathers.

The Roman mines in Cardiganshire, in Shropshire, and some other counties, show us that the followers of Julius Cæsar sought with great industry to render the natural treasures of Britain available for useful ends. The in-

scribed pigs of lead, and ingots of copper, which have been discovered and preserved, acquaint us with this, and prove the Romans to have been not only successful miners but skilful metallurgists. From the departure of the Romans, after their four hundred years of occupation, we have no reliable evidence of the progress of British mining for upwards of five centuries.

It is, however, certain that mining operations must have been prosecuted during this period, as we find the tinners of Cornwall and Devon of sufficient importance to obtain from king John, in the 3rd year of his reign, a charter granting them especial, indeed tyrannical, privileges.

Presuming, it would appear, upon the patronage bestowed on them, they assumed to themselves extraordinary powers. We find a petition to Parliament, in the first year of the reign of Edward I., asking for protection from the incursions of the miner, stating, "The said tinners do daily dig and claim to dig in every species of land, as well in tilled as in other lands, and destroy houses, meadows, and woods, and divide and turn the course of water, running as well to mills as elsewhere, throughout the whole country, to the great destruction and dispersion of the said commonalty."

At a later period several of our monarchs gave every encouragement to mining operations, and Queen Elizabeth persuaded many German miners to come to this country, to whom she granted free right of search for minerals over the most important mining counties. The purpose of that Queen was to introduce a better system of exploration than that which then prevailed. From this period, the progress of our mineral industries is tolerably well defined, and we may record a steady advance in the rate of production, until we find the value of our metals and minerals, exclusive of building stones and clays, to have been in 1861, £34,602,853.*

The thoughts of men, therefore, have been turned to the mineral conditions of these islands for more than two thousand years. In that period the *art* of mining has improved; and the engineering appliances which have been brought to bear upon the ventilation and the draining of mines, are fine examples of mechanical ingenuity. The *science* of mining, however, can scarcely be said to have, as yet, an existence. In 1856, Mr. John Taylor, who must be regarded as a good authority, stated before a committee of the House of Commons, "That there were no greater facilities for ascertaining the productive character of a mine now than formerly. The difference was simply in improved machinery. Our knowledge was not greater than that of our forefathers." Whatever was said in 1856, is true in 1862, and it is a sad reflection that it is so.

When the powers of the mind have been directed to any peculiar set of natural phenomena for a prolonged period, we usually discover in hypotheses advanced, and in theories more or less supported by facts, attempts to explain the causes which have been active in producing the effects observed. There is a curious absence of this in relation to mining. Beyond some very undefined notions that fire played an important part in the formation of minerals, or that mineral veins have some analogy to the veins in the animal body, or the branches of a tree, no hypotheses have been hazarded by miners proper. A few men, educated in the schools of the continent, and two or three professors of science in this country, have, it is true, promulgated their opinions, but until Werner published his theory, they advanced but little beyond the creations of fancy. It will not be without interest to examine the causes of this.

The miner has ever been a distinguishable man amongst the hosts of his brother men. Working in solitude in the dark recesses of the rocks, he has become thoughtful, with only the dreams of ignorance on which to employ his thoughts. Hence he has peopled the subterranean world with "kobals;" and even the smothered sounds of waters dropping in some unopened cave have become to him the realisation of the "knockers"—unkind gnomes, who mock him in his toils, and who as frequently lead him from, as guide him to, the mineral mass on which they are supposed to labour. Habituated to danger, the miner becomes careless of death, and his life is a constant declaration of his belief in fatality. Superstition finds her fitting home in the dark places of the earth, and reigns supreme in the dark mind of an untaught man. Therefore the dominant Powers to the miner have been the creations born of ignorance and night. Signs and tokens, lucky and unlucky days, ill-wishes, evil-eyes, witchcraft and charms, were the rulers of his life.

Although the influences of ordinary school-education have penetrated to the most remote mining districts, and produced the usual humanising effects, yet the miner retains many of the peculiarities which belonged to his forefathers. Whether we examine the miners of Alston-Moor, of the dales of Yorkshire, of North Wales, or of Cardiganshire—the scattered workers of the mines of Shropshire, or the large mining population of Cornwall—we shall discover the same general peculiarities.

As a body, miners may be regarded as a religious class, but, theirs is a religion of the heart, not of the head. They are powerfully swayed by their feelings, to the repression of the influences of reason. Hence the tendency to those impulsive manifestations of a religious conviction which are known as "Revivals." Except, however, where the miners have been brought under the guidance of the Wesleyan Methodists, or of the leaders of some sect who adopts the system of appealing strongly to the passions, their religion is only a superstitious dread of something unseen—unknown. Thoughtful, we have said they are, but their thoughts flow slowly, and they have ever a tendency to dwell on the darker shades of life; while it is with extreme difficulty that they can be brought to communicate their thoughts to others. Miners are rarely frivolous, even *above* ground; they are especially serious *below*. The youngest men will express their dislike of idle conversation or of joking in the mine, while whistling is strictly forbidden. In the sports and pastimes of a mining village there is something peculiarly sober; and the celebration of the annual feast, with its attendant fair, has something of a sombre character about it, in comparison with agricultural revels.

A sanguine temperament may be said to distinguish a miner. He is for ever hoping that stores of mineral wealth are a little in advance of his labour. Therefore, although in relation to the ordinary affairs of life, he is trustworthy, showing a real love for the truth, he is curiously carried away from it when describing the state of a mine, and he expresses his hopes rather than records his knowledge. The exaggerations exhibited in some reports on mines are often of an amusing character, running, indeed, into poetical rhapsodies. Many an unfortunate adventurer has, however, to date his ruin from the day when he gave credence to the hyperbole indulged in.

From their very childhood miners are trained to observe. As boys they are employed to separate the valuable ore from the useless stones with which it is mixed, and this is often a delicate operation. In their labours underground everything depends upon their careful observations, especially in those mines where the system of "Tribute pitches" is adopted; the miner ("tributer," as this class is called) receiving an agreed share of the profit derived from the sale of the ores which he breaks out of the lode. Yet their powers of observation are of a very limited order. Their experience is made up of a knowledge of peculiarities existing within a confined area. So long as these repeat themselves the miner's deductions are correct; but vary the phenomena ever so slightly, and he is at once at fault. This is continually occurring. Within the circle of their labours a few men will probably arrive at a tolerably exact knowledge of the conditions existing, and this knowledge gives them a pre-eminence

* "Mineral Statistics," by Robert Hunt.

amongst their fellow miners as advisers. But remove one of these men from his own locality, he is rarely able to group the new phenomena presented to his view; he feels he is ignorant, though he is rarely so boldly honest as to proclaim it; and he commits himself to statements which are only vague guesses, happy, indeed, if any one of them proves correct.

It is interesting to examine the unmistakeable Celtic manners ot the south and west of England, and then those which have a more directly Teutonic origin, of the northern districts. There are differences in the habits of life of the man, but the idiosyncrasies of the miner are the same. This may be due in part to the intermixture which has taken place between the mining races. The German miners who came to England when Elizabeth was queen, settled, some in Cumberland and some in Cornwall. Edward the Black Prince is said to have taken many hundreds of the lead miners of the northern counties to work the rich silver-lead mines of North Devon, and the Cornish miners are allowed the merit of having introduced improved machinery into the mines of Durham and Northumberland. Beyond the similarities which may be traced to this interchange, there are others which clearly belong to the business of mining, and which are probably as old as the days when Job said, "Surely there is a vein for the silver, and a place for the gold, where they fine it. Iron is taken out of the earth, and brass is molten out of the stone."

The psychological influences of subterranean toil form a strange but interesting subject of study. These and the effects of that continued uncertainty as to the reward which labours of the severest kind are to receive, are distinguishingly marked on every miner. In occult powers they are believers; and when, about a century since, the "Divining Rod" was introduced into Cornwall as a means for finding mineral lodes, it was eagerly seized upon, and, to the present day, several families are supposed to possess remarkable powers as diviners, or, as they are commonly called, "dowsers." The most elementary laws of science are still a book sealed to the large majority of miners, and while they are, of all men, themselves the most theoretical, they always meet any attempt to explain phenomena upon the evidences of inductive research, by pronouncing the explanation to be a "theory," which is of no value to a "practical."

We therefore find that the means adoped for determining the value of a mineral district, or of a metalliferous vein, are of the most uncertain character. The task is committed to men who have only their prejudices to guide them. By prejudices we must be understood to signify crude opinions, formed from mere experience—an empirical knowledge of the most imperfect kind. "Without principles, one mining agent recommends a trial to be made, which another rejects as unworthy, consequently, should there be funds at command, and a sufficient period of time allowed to elapse, no portions of the veins or lodes are left untried, and practically, the art of mining has degenerated into a mere try-all system."

The author whom we have quoted (Wallace), himself a miner, continues: "The impossibility of arriving at any knowledge of practical value respecting ore deposits in veins, is avowed by those who, with singular inconsistency, attach the greatest importance to individual experience. Even some occupying high distinction as directors or proprietors of mines, affirm, without qualification, that it is impossible to see through solid rocks; or they summarily dismiss further considerations on the subject, by remarking that the old adage current among miners expresses an important truth, namely:—

> It is only by cutting the ground
> That the metal is found.

The Cornish miners express their doubts by a similar phrase:—

> Where it is—there it is.

If these are not the apologies of indolence and ignorance, they certainly are the utterances of despair."*

It must be admitted that amongst the miners there is an entire absence of any method by which a knowledge may be obtained of the causes leading to the production of mineral deposits. While the speculations of those philosophers who will not endure the toil of subterranean investigations are wild, and consequently valueless.

The natural consequence of this imperfect knowledge is, that all mining operations are necessarily attended with much uncertainty. From time to time a most productive mine is discovered. The Devon Great Consols, first known as Huel Maria, has paid £826 dividends upon every share, one pound only having been paid for shares now worth £490 each. Upon the shares of South Caradon, near Liskeard, the trifling sum of 25s. only was ever paid; the last price of those shares was £390; and £391 profit has been paid on every share.

There are other examples of great success in mining. Such results as these are laid hold of by designing men, and used to bait the hooks by which those who are in a hurry to be rich are to be caught. Permission to search for minerals is obtained from the possessor of the land near to some productive mine. A few trial pits are probably made, and then comes the formation of a company to work "Huel Chance" (or some more attractive name is adopted), through which the lodes from the fortunate neighbour are shown, by the aid of a parallel ruler, to run. Twenty thousand shares is a usual number; but we see 25,000, 30,000, and even 65,000 shares proposed in prospectuses issued to the public. These are offered at £1, at £2, and at £5 per share. By a very ingenious system of puffing, by "reports" obtained from practical miners, by exhibiting specimens of ore—"slocking stones," not always obtained from the mine, the riches of which they are supposed to represent, and by the occasional "wireing" (the cant term for telegraphing) great discoveries which have but little reality—large numbers of those shares are sold. From the nominal capital a deduction of from 20 to 30 per cent, must be made. The speculators on the mining market are of three classes, men with no means whatever, men possessing but very little money, and men with names, who become the promoters or directors of such mines as these for a "consideration." The mine has probably originated with men of one or other of these classes; they obtain their remuneration by exacting from the company when formed, free shares or money, and either one or the other is taken from the nominal capital with which the mine will stand charged. Transactions of this character and sundry enigmatical operations connected with buying and selling of shares, swallow up much more of the subscribed capital; everything is carried on with that easy assurance which deceives the unwary, and the audacity with which false statements are made, often throws the experienced off their guard. The works at the mine, of course, go forward, and a manager is engaged who will report the wonderful prospects of the undertaking. If by accident a discovery of ore is really made, the promoters are soon enriched, and all goes "merry as a marriage bell." If no such accident favours them, they draw largely upon the credulity of their dupes, and, having obtained as much money as possible from them, there is a sudden collapse of the affair.

Such is the character of a number of the mining companies which rise rapidly and perish with equal rapidity. Any system based on misrepresentation must dread the introduction of real knowledge, and, consequently, all those who are concerned in such a system desire that ignorance should prevail, and they sometimes boldly persuade the miners that it is a "folly to be wise."

There is, however, a more satisfactory chapter than this

* "The Laws which Regulate the Deposition of Lead Ore in Veins, illustrated by an Examination of the Geological Structure of the Mining Districts of Alston Moor." By William Wallace. London: Stanford.

in the history of British mining; and after the experience of considerably more than twenty years—with constant attention to the subject—I feel assured that mining, commenced with proper judgment, legitimately carried onward, guided by the advice of experienced miners, and directed by honest intentions, is as satisfactory a speculation as any in which a capitalist can engage. In evidence of this it is pleasing to adduce an instance of the result of undeviating honesty and ordinary caution. Upwards of fifty mining adventures were entered on; these represented a net capital of about £500,000; the mines were worked, exhausted, and abandoned. During the period between their commencement and termination these mines made a profit of upwards of £800,000.

Thus we learn that, notwithstanding the uncertainty which attends all mineral explorations in the present state of our knowledge, adventurers may, by availing themselves of the assistance of men whose judgment has been formed by a careful study of any selected locality, and whose opinions are not biased by improper influences, not merely escape loss, but actually realise a fair profit if their speculations are sufficiently extensive. By this is intended, the advice of an old and successful miner—Never to put all your capital into one mine, but to extend it over many mines.

The question, however, still naturally arises—are there any methods by which may be determined, before commencing operations and expending capital, whether there are metalliferous minerals in the vein it is proposed to explore? By stating briefly a few of the speculations which have been brought forward, it will be seen how curiously men have avoided the labour of investigation, and contented themselves with random guesses. Agricola, the earliest writer on the art of mining, had some clear views on the science of mineralogy in its widest sense. He believed the deposits in the lodes to have taken place from water, but his chemical knowledge did not enable him to understand the process. The dim light thrown by Agricola on the subject soon went out, and at the commencement of the last century fermentation was the favourite hypothesis—*la fermentation dans certains points particuliers de la montagne*. Organisation, or something analogous to vegetable growth, followed upon this—*Les filons puissants en sont les branches principales; les veinules et les filets en sont les rameaux.* (Lechmann.) The time at my disposal will not admit of a detailed examination, with the requisite care, of the evidences which have been brought forward to support the views promulgated from time to time by different writers on the involved problem of metalliferous deposits in veins. Amongst the older writers we find Rösler, Delius, Baumer, Gerhard, and a few others, regarding water as the agent employed by nature to fill the veins with mineral matter.

Becher, Stahl, Henkel, Von Oppel, Hutton, and Playfair suppose those veins to have been formed by the operation of subterranean heat. Hoffman, Zimmerman, and Wallerius, who write with that involved caution, which ever betrays the want of clear views, devise hypotheses which oscillate between fire and water. Amongst modern writers we find Fournet advocating the aqueous theory,* and Bishoff powerfully supporting it, with the addition of chemical forces which appear necessary to the production of the mineralogical phenomena observed. Professor Cotta, who has studied with much care the apparent relations between igneous rocks and ore-veins, assumes that the metals originated in the depths of the earth, and that, under the influence of heat, they have been sublimed, to be deposited in the colder cracks near the surface. Delesse is clearly disposed to refer eruptive rocks and mineral lodes to the same cause, and Amédée Burat follows this path.† The leaning of Deville is also in this direction. Leithart puts forward some vague ideas on electrical action. This writer's subterranean geometry is good, but his physics are sadly at fault. Becquerel records some exceedingly curious experiments, showing that electric currents will produce many of the phenomena observed in mineral deposits. Robert Were Fox has produced miniature veins in clay by the long-continued action of weak voltaic currents. These experiments have been repeated by myself upon a much larger scale than those originally made by Mr. Fox, and the results have been in remarkable confirmation of that gentleman's views. All the more important writers who have dealt with this subject have now been named. Sir Henry de la Beche, who commenced the Geological Survey of the Kingdom, and established the Museum of Practical Geology, showed much interest in the subject, but he can scarcely be regarded as an original investigator in this branch of the science. Mr. W. Jory Henwood has given us a valuable record of facts connected with the mines of Cornwall, and Mr. W. Warington Smyth has admirably described the mineral deposits of Wicklow and of Cardiganshire, but they are silent on the agencies to which they would refer the appearances which they have studied.

Two views, however, which have been variously modified by different writers on geognostical, as distinguished from geological phenomena, prevail. One, represented by Hutton and Playfair, is intimately connected with the igneous hypothesis of the earth's formation; while the other, which may be said to be embodied in the views of Werner, supposes all mineral deposits to have taken place from water.

"Look," says Dr. Hutton, "into the sources of our mineral treasures. Ask the miner from whence has come the metal in his veins. Not from the earth or air above, nor from the strata which the vein traverses; these do not contain an atom of the minerals now considered. There is but one place from whence these minerals may have come—this is the bowels of the earth, the place of power and expansion; the place from whence has proceeded that intense heat by which loose materials have been consolidated into rocks, as well as that enormous force by which the regular strata have been broken and displaced."—*Theory of the Earth*, vol. i. p. 180.

"What I may challenge as my own particular discovery," writes Werner, "is, *a*, to have determined and described in a more particular manner the internal structure of veins, as well as the formation of the different substances of which they are composed, and to have settled the relative age of each; *b*, to have given the most accurate observations and most perfect knowledge of the meetings and intersections of veins, and to have made these observations subservient to the determining their relative ages; *c*, to have determined the different vein formations, particularly metalliferous veins, as well as their age; *d*, to have been the first who entertained the idea that the spaces which veins occupy were filled by precipitations from solutions."—*New Theory of the Formation of Veins: Abraham Gottlob Werner.*

Geological philosophers conceive it to be necessary to start with the hypothesis of a cooling sphere. Without this they believe they are not enabled to account for many of the phenomena which are presented to them in the wide field of their interesting labours. That many rocks bear unmistakeable evidence of an igneous origin cannot be denied. They have been forced by some tremendous subterranean power through the superincumbent strata—they have altered the character of the rocks through which they have passed—they have overflowed at the surface, and spread out upon the sedimentary formations, and their physical structure and chemical composition prove them to have been once fluid or plastic under the influence of heat. Beyond those truly igneous rocks, many of the deep-seated masses forming the earth's crust have been referred to the action of heat. For a long period the Plutonic theory prevailed, and mineral for-

* "Etudes sur les Dépots Métallifères," par M. J. Fournet. Paris: Levrault. 1834.

† "Traité du Gisement et de l'Exploitation des Minéraux Utiles," par M. Amédée Burat. Paris: Langlois et Leclercq.

mations were, without exception, involved within its fiery mantle. Eventually, as the science of geology passed from the regions of speculation into the more trustworthy paths of observation, it was seen that water had played, and is still performing, some most important parts in the Earth's mutations. Consequently the balance now oscillates with a tolerable degree of uniformity between fire and water.

We have only to deal with these views in their relation to metalliferous deposits. The "Mineral Veins" of Mr. Belt* supports the igneous origin of the quartz veins, or "reefs," as they are called, of Australia. He thinks that he perceives in them conditions analogous to the trap dykes—which he had previously studied—intersecting the coal fields of Durham and Northumberland. Mr. Belt says "If we admit the igneous origin of granite, and British geologists at least have admitted it, the conditions under which it must have been intruded and consolidated are those that would also give rents or fissures, and fill them with metallic and mineral substances."

Mr. Wallace, the author of "The Laws which regulate the deposition of Lead Ore in Veins," is of the school of Werner, and he believes that he has determined certain laws regulating the formation of the metalliferous matter in veins. His positions take a most important form, and they should become the subjects of serious consideration to all who are interested in the expenditure of money in mining exploration. He proposes to lead the miner to such a knowledge of natural phenomena, as will enable him to say, from the position of a mineral vein, if it will be worth working. Whether Mr. Wallace's views be adopted or not, we believe there will be but few readers of his book who will not be struck by its logical character. From the 'Introduction' we glean that Mr. Wallace is a practical miner, engaged at the present time in carrying on important mining operations in Cumberland. He tells us "it has not been my lot to obtain the inestimable boon of a literary training;" and, again, he fears "the distraction of thought unavoidably caused by the performance of official duties, necessarily tends to render the style unequal, and the chain of ideas somewhat broken and disconnected, especially upon a difficult subject depending upon long and intricate investigations, carried on in a locality where there is no assistance to be obtained from scientific libraries, or intercourse with scientific men."

We are disposed to think it fortunate that this thoughtful man has been so placed by Providence as to be compelled to look at nature, and read her "sermons in stones," without being brought under the disturbing influences of society.

The work commences with a careful examination of the geology of Alston Moor, which may be regarded as fairly representing the principal district in which deposits of lead occur.

The positions supported may be grouped thus:—

1. That Alston-Moor consists, geologically, of a series of alternating strata of limestone, sandstone, and shale, and one layer of igneous rock.

2. That those strata are penetrated, or pierced through, by a considerable number of fissures, of which by far the greatest number have a main general direction from the north of east to the south of west.

3. There are a few mineral veins which are locally called "cross veins," running nearly north and south.

4. The largest quantity of lead ore has been found in the former, though the latter are not deficient of metalliferous ores; but whether in the former or in the latter, the lead is found in the limestone beds, not in the sandstone or shale. (A few remarkable exceptions occur in this and other lead-producing districts, but the rule is as above stated, clearly pointing to some peculiar condition existing in the limestone rocks, which disposes the sulphide of lead to accumulate in them.)

* *Mineral Veins: an Inquiry into their origin, founded on a study of the Auriferous Quartz Veins of Australia.* By Thomas Belt. London: Weale.

Mr. Wallace is disposed to reject the commonly received idea, that the fissures were formed during the consolidation of the rocks through which they run:—"Sedimentary rocks have been consolidated under the bed of the ocean by immense pressure. A mass of clay consolidated under a pressure of some hundreds of thousands of pounds per square foot is not likely to contain many cracks or fissures." It is admitted that all the enormous masses of rock-formation, included within the Carboniferous series, have been formed in the bed of the Old Red Sandstone ocean, and gradually upheaved to their present position, suffering, during this uplifting, an enormous amount of denudation. "The effect that would be produced by the removal of such pressure from extended sheets of hard rock is well worthy the attention of geologists," says Mr. Wallace, and he then clearly indicates his belief that small cracks or fissures have been formed during the mechanical process of upheaval, and the subsequent one of denudation, relieving the underlying rocks from pressure. These have been gradually enlarged by chemical and mechanical forces until they present their existing appearance. It is not possible for us to follow Mr. Wallace in his clear statement of facts, or to give his reasonings, generally marked by great logical discrimination. Suffice it that we state—and this is enough for our purpose—the general bearings of the views put forth by this industrious and cautious observer. After a most painstaking examination of the contour of the country, and the direction of the water shed, not only at the present time, but as it probably existed during the epoch when the veins were forming, Mr. Wallace deduces his "laws of hydrous agency." It is shown that the accumulation of lead ore in the veins is directly connected with the facilities which were offered by the fissures for the flow of water through them; this water—if we read our author right—being atmospheric, and not, as Werner and some others suppose, oceanic. This water, falling on the surface, charged with oxygen and carbonic acid, is supposed by this hypothesis to derive its mineral matter from the rocks through which it penetrates, and that, subsequently, flowing through the cracks in the rocks—this is deposited as "vein-matter", against the sides, or, as they are called, the "walls of the lode."

Quoting Coleridge, who observes that "the metal, at its height of being, seems a mute prophecy of the coming vegetation, into a mimic semblance of which it crystallises," the author sums up his evidence and makes his deductions. We have followed Mr. Wallace with the most thoughtful attention, and we believe that we shall express the strong features of his hypothesis most clearly by putting it in the following form:—

If it is possible to determine, with any approach to accuracy, the laws which regulated the flow of water through the fissures of any set of rocks, it is possible to predict before working any mineral lode—regarding it as a fissure filled in—whether it is likely to contain metalliferous matter or otherwise, the deposits of metallic ores being dependent on the intensity of force exerted by the aqueous agent, or, in simple language, by the quantity of water flowing through the fissure.

An important addition has been made to our knowledge in the publication, by Mr. Lonsdale Bradley, of Richmond, Yorkshire, of "An Inquiry into the Deposition of Lead Ore in the Mineral Veins of Swaledale."* There is nothing theoretical in this work. A series of sections are given, with sufficient explanations, showing with accuracy the conditions under which a metalliferous condition prevails in the mines of Swaledale.

Mineral veins are either fissures—vast rents—produced by disturbances in the outer crust of the earth, which have been, during the lapse of ages, filled in with matters of various kinds, much of it being metalliferous, or they have resulted from the aggregation of like particles of matter,—which were previously disseminated—during the

* Published by Stanford, Charing-cross.

gradual consolidation of the rocks, forming, at first, slight strings, thin bands, or small concretions. These have given rise to the exercise of crystallogenic force, and thus produced space for the formation of larger deposits.

The last hypothesis considers the mineral veins and the rocks enclosing them to be contemporaneous. The first supposes the rocks to be older than the lodes running through them.

I have rapidly sketched the conditions which exist, at the present time in relation to the mining operations in this country, in especial relation to the amount of knowledge which has been brought to bear on this important subject. I have endeavoured to direct attention to the fact that during a long period of time no advance has been made in our knowledge of the phenomena of mineral deposits; to show how purely speculative have been nearly all the explanations which have been published, in fact, to insist upon the position that empirical knowledge only has been brought to bear on a subject which materially connects itself with the prosperity of the land. I have approached the subject in the most entire independence; I am unbiased by any interest; my desire is purely and simply to aid in the introduction of some system which shall remove mining from that realm of speculation in which it has been suffered to remain.

It is important, in the next place, ere proceeding, to examine the question, Can anything be done?—to see if the value of the product is deserving that attention which is necessary to ensure a more satisfactory result. By the continuous labour of some years I have succeeded in securing for this great mining country a statistical record of our mineral produce, which is not excelled by that of any country in the world. The results for the last three years are shown in the following tables:—

COAL.

Number of Collieries, and Quantities and Total Value of Coals raised in each County in England, Wales, Scotland, and Ireland, in each of the Years 1859, 1860, 1861.

COUNTIES.	Number of Collieries.			Quantities of Coals raised.		
	1859.	1860.	1861.	1859.	1860.	1861.
England.				Tons.	Tons.	Tons.
Northumberland and Durham...	283	283	271	16,001,125	18,244,708	19,144,965
Cumberland	28	28	28	1,041,890	1,171,052	1,255,644
York	383	387	397	8,357,100	9,284,000	9,374,600
Derby	151	153	158		4,940,000	5,116,319
Nottingham	23	21	22	5,050,000		
Leicester	14	14	11		730,000	740,000
Warwick	17	17	16	355,750	545,000	647,000
Stafford and Worcester	549	568	580	6,125,000	7,648,300	7,253,750
Lancashire	381	371	373	10,650,000	11,350,000	12,195,500
Cheshire	35	35	39	700,500	750,500	801,570
Shropshire	59	68	66	765,750	850,500	829,750
Gloucester	60	63	71			
Somerset	35	37	40	4,850,000	5,503,400	6,511,025
Devon	2	2	2			
Total	2,020	2,047	2,074	53,897,115	61,017,460	63,870,123
Wales, North	81	84	78	1,662,000	1,750,500	1,870,250
,, South	362	378	403	6,000,350	6,254,813	6,690,771
Total	443	462	481	7,662,350	8,005,313	8,561,021
Scotland	413	427	424	10,300,000	10,900,500	11,081,000
Ireland	73	73	73	120,300	119,425	123,070
Total for United Kingdom	2,949	3,009	3,052	71,979,765	80,042,698	83,635,214
				Estimated Value.		
				£ 17,994,941	£ 20,010,674	£ 20,908,803

This enormous amount of wealth is annually produced from our rocks by the exercise of human industry. In our collieries, too, a vast amount of merely animal force is employed under the direction of a few individual minds trained to the duties. Method has usually been fairly introduced, and the colliery owner, under the guidance of the viewer, has availed himself of that knowledge which science can only give. The lamentable casualties, however, which are continually recurring, prove that there is yet much to do in the way of instruction; and let me ask is it not in evidence that the great loss of life, which is shown by the colliery inspector's report, amounting to about 1,000 in each

COPPER.

Number of Copper Mines, and Quantities and Total Value of Ore in each County of England, Wales and Ireland, and of Fine Copper produced therefrom in each of the Years 1859, 1860, and 1861.

COUNTIES, &c.	Number of Mines.			Copper Ore.			Fine Copper.		
	1859.	1860.	1861.	1859.	1860.	1861.	1859.	1860.	1861.
England and Wales.				Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Cornwall	121	96	97	183,498	182,534	181,594	12,202	12,210	11,663
Devon	10	20	20						
Cumberland and Lancashire	5	6	7	3,225	2,628	2,331	624	184	168
Anglesey	3	2	3	8,386	7,713	8,792	448	416	486
Carnarvon	2	3	5	2,252	2,623	2,079	99	114	109
Cardigan	3	5	2	35	75	67	3	5	5
Montgomery	1	...	1	...	...	115	...	...	8
Isle of Man	1	4	3	35	753	1,485	26	53	93
Cheshire	1	1	1	10,27	227	335	427	155	215
Total for England and Wales	147	137	139	208,021	196,553	196,798	12,829	13,137	12,747
				Estimated Value.					
				£ 1,379,801	£ 1,259,660	£ 1,118,810	£ 1,532,996	£ 1,414,745	£ 1,307,842
Ireland.				Quantities.					
				Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Cork	2	3	4	4,536	6,466	7,350	474	651	780
Tipperary	3	...	...	298	...	...	29	...	...
Waterford	1	1	1	6,090	7,765	6,670	635	756	667
Wicklow*	3	6	3	3,238	4,180	1,641	106	586	27
Clare	1	..	...	96	...	...	4	...	...
Total for Ireland	10	10	8	14,258	18,411	15,661	1,248	1,993	1,474
				Estimated Value.					
				£ 108,171	£ 167,540	£ 141,263	£ 125,215	£ 206,564	£ 151,232
				Quantities.					
Copper ore purchased by private contract from sundry districts not included above	14	23	20	Tons. 14,510†	Tons. 21,732	Tons. 19,028†	Tons. 693	Tons. 838	Tons. 1,110
				Estimated Value.					
	...	...	...	£ 18,863	£ 79,983	£ 104,654	£ 76,489	£ 84,952	£ 113,406
				Total Quantities.					
Total for England, Wales, and Ireland	171	170	167	Tons. 236,789	Tons. 236,696	Tons. 231,487	Tons. 15,770	Tons. 15,968	Tons. 15,331
				Total Estimated Value.					
	...	...	...	£ 1,506,835	£ 1,507,183	£ 1,364,727	£ 1,734,700	£ 1,706,261	£ 1,572,480

* In addition to these copper ores, some copper is separated from the iron pyrites of Wicklow.

† Including some iron pyrites from which copper is separated.

LEAD.

Number of Lead Mines (selling ore), Quantities and Total Value of Ore Raised, and of Metallic Lead Produced therefrom in England, Wales, Scotland, and Ireland, in each of the Years 1859, 1860, and 1861.

Counties.	Number of Mines. 1859.	1860.	1861.	Lead Ore. 1859.	1860.	1861.	Lead. 1859.	1860.	1861.
England.				Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Cornwall	35	38	44	7,842	6,401	6,690	4,985	4,242	4,229
Devon	9	16	11	3,172	3,019	2,762	2,090	2,030	1,791
Cumberland	62	84	79	7,180	7,041	6,324	5,250	5,130	4,614
Durham and Northumberland	30	39	39	19,571	20,200	19,536	14,568	15,186	15,252
Westmoreland	2	6	6	247	362	2,392	125	270	1,576
Cheshire	1	1	1	160	7	106	69	3	25
Derby*	...	...	...	10,929	6,710	7,376	5,853	4,564	5,178
Shropshire	4	4	9	4,062	4,032	4,616	3,008	3,161	3,547
York	13	22	30	9,704	10,665	8,801	6,338	7,099	6,203
Somerset	4	4	4	850	800	860	400	357	330
Stafford	1	1	1	36	115	40	20	·75	25
Total for England	161	215	224	63,753	59,352	59,503	42,706	42,117	42,770
Wales.									
Cardigan	23	39	43	7,466	7,355	7,755	5,569	4,952	5,886
Carmarthen	3	3	3	913	781	1,442	637	575	1,000
Denbigh	11	14	14	5,076	6,182	7,647	3,981	4,714	5,498
Flint	26	26	48	4,099	4,947	4,410	3,118	3,767	3,396
Montgomery	12	17	14	2,573	2,136	2,452	1,954	1,592	1,830
Merioneth	2	5	3	303	263	207	196	200	155
Pembroke	...	1	1	...	230	97	...	158	52
Radnor	1	2	2	69	50	37	45	35	23
Caernarvon	4	18	19	157	233	172	120	166	124
Total for Wales	82	145	147	20,656	22,177	24,219	15,620	16,159	17,964
Isle of Man	3	5	5	2,464	2,810	2,717	1,880	2,091	2,043
Scotland.									
Ayr	...	...	1	...	...	1	...	...	$\frac{3}{4}$
Argyle	1	1	1	44	21	39	34	16	29
Kirkcudbright	3	2	2	148	69	115	117	48	84
Lanark	1	1	1	935	1,053	742	656	737	520
Dumfries	1	1	1	750	750	803	500	500	552
Perth	1	1	1	69	80	60	40	57	43
Total for Scotland	7	6	7	1,946	1,973	1,760	1,347	1,358	1,228
Ireland.									
Louth	1	...	...	20	...	...	14	...	...
Armagh	1	1	1	60	60	45	38	35	29
Clare	2	1	...	57	95	...	38	64	...
Cork	...	...	1	...	...	280	...	...	221
Down	1	1	...	228	168	...	170	128	...
Wicklow	3	2	2	2,047	1,928	1,926	1,332	1,230	1,232
Monaghan	...	...	1	...	...	100	...	...	70
Waterford	2	3	2	40	130	52	29	98	40
Galway	1	1	...	5	11	...	3	7	..
Total for Ireland	11	9	7	2,457	2,392	2,403	1,624	1,562	1,592
Sundries	...	...	...	105	40	55	56	30	37
Total for United Kingdom	264	380	390	91,381	88,744	90,657	63,233	63,317	65,634
				Estimated Value.					
				£ 1,256,641	£ 1,232,063	£ 1,136,249	£ 1,410,095	£ 1,412,760	£ 1,445,255

* The number of Mines in Derbyshire is not known, but the ore is generally obtained from small workings, producing only from a few cwts. to two or three tons per annum.

IRON ORE.

Quantities and Total Value of Iron Ore raised in each county of England and Wales, and in Scotland and Ireland, in each of the years 1859, 1860, and 1861.

COUNTIES.	1859.	1860.	1861.
ENGLAND AND WALES:—	Tons.	Tons.	Tons.
Northumberland and Durham	13,320	12,500	10,750
Cumberland	403,177	468,782	472,195
Lancashire	445,046	520,829	519,180
York, West Riding	175,000	255,700	235,500
,, North ,, ...	1,520,342	1,471,319	1,130,761
Derby	325,500	375,500	396,520
Stafford	1,449,000	1,523,929	1,226,695
Oxford	6,033	5,833	5,600
Buckingham and Northampton	130,058	95,664	113,139
Lincoln	2,000	16,892	33,559
Warwick...	30,500	19,500	15,250
Shropshire	197,589	165,500	223,400
Flint, &c....	87,072	85,097	86,500
South Wales	649,758	630,705	545,706
Gloucester	106,292	90,466	100,420
Somerset...	29,083	24,102	32,763
Wilts	28,993	76,201	55,779
Hants	9,725	6,119	4,008
Devon	3,598	3,836	5,399
Cornwall...	35,213	23,953	26,262
Total for England and Wales	5,647,299	5,872,427	5,239,386
Isle of Man	1,282	1,671	967
Scotland	2,225,000	2,150,000	1,975,000
Ireland	3,000	106	165
Total for United Kingdom	7,876,581	8,024,204	7,215,518
	Total Estimated Value.*		
	£ 2,507,860	£ 2,466,929	£ 2,302,371

* The estimated value at the place of production.

PIG IRON.

Quantities and total value of pig iron made in each county in England, Wales, and Scotland, in each of the years 1859, 1860, and 1861.

COUNTIES.	QUANTITIES.		
	1859.	1860.	1861.
ENGLAND AND WALES:—	Tons.	Tons.	Tons.
Northumberland	31,500	69,093	73,260
Durham	370,339	340,921	312,030
Cumberland ....}	76,588	87,950	55,165
Lancashire ....}		81,250	109,377
York..................................	301,077	346,765	377,521
Derby	139,250	125,850	129,715
Stafford and Worcester	616,800	616,450	583,350
Shropshire	149,480	145,200	140,791
Flint, &c.............................	26,980	49,360	46,658
South Wales	985,290	969,025	886,300
Somerset ....}	10,500	1,960	17,330
Wilts. ....}		21,875	
Gloucester	31,750	26,458	23,163
Northampton........................	12,800	7,595	7,730
Total for England and Wales...	2,752,354	2,889,752	2,762,390
Scotland	960,550	937,000	950,000
Total for United Kingdom ...	3,712,904	3,826,752	3,712,390
	ESTIMATED VALUE.		
	£ 11,138,712	£ 11,480,256	£ 9,280,975

GOLD.—1861.

During this year, for the first time, Gold, in sufficient quantity to demand a section of our mineral returns, was produced from the Vigra and Clogan Mines, in Merionethshire, to the extent of 2,886 ounces 3 dwts., the value of which was £10,816 17s.

SILVER.

Quantities and Total Value of Silver extracted from Lead Ore raised in each county in England and Wales, and in the Isle of Man, Scotland, and Ireland, in each of the years 1859, 1860, and 1861.

COUNTIES, &c.	1859.	1860.	1861.
ENGLAND:—	Ozs.	Ozs.	Ozs.
Cornwall	215,964	180,757	173,344
Devon	66,875	53,059	45,187
Cumberland	39,406	32,806	37,115
Durham and Northumberland ..	74,222	84,254	78,265
Westmoreland...	431	1,695	21,214
Staffordshire	...	...	125
Yorkshire	1,178	3,385	3,650
Shropshire	...	...	1,317
Derbyshire	3,000	...	1,000
Somersetshire	950	850	850
Cheshire	150	45	95
Total for England ...	402,176	356,853	362,162
WALES:—			
Pembroke	...	1,116	400
Cardigan	37,787	44,807	54,989
Carmarthen	1,700	1,310	2,680
Denbigh...	14,318	16,661	20,539
Radnorshire	125	175	...
Flint	22,693	31,092	25,779
Montgomery	6,036	7,665	11,169
Merioneth	962	1,076	988
Carnarvon	480	1,162	990
Total for Wales	84,101	105,064	117,534
Isle of Man	56,974	60,170	67,282
Scotland	4,022	3,140	4,133
Ireland	13,998	14,365	12,398
Sundries	346	277	222
Silver from (Silver Ore)	16,660	8,871	5,799
Total for United Kingdom	578,277	628,740	569,530
	ESTIMATED VALUE.		
	£ 158,407	£ 172,903	£ 144,161

ZINC.

Number of Mines in Great Britain, Ireland, and the Isle of Man. Quantity of Ore and Metallic Zinc produced therefrom in each of the years 1859, 1860, and 1861.

COUNTIES, &c.	NUMBER OF MINES.			ZINC ORES.		
	1859.	1860.	1861.	1859.	1860.	1861.
				Tons.	Tons.	Tons.
Cornwall	18	19	6	2,423	4,772	5,694
Devon...	2	3	1	289	217	51
Derby...	*	*	*	1,500	1,470	1,225
Shropshire	1	...	...	66	...	...
Cumberland... ...	3	3	3	660	558	597
Cardigan	7	8	8	2,436	2,230	1,807
North Wales	8	8	8	3,089	2,543	2,250
Isle of Man	1	1	1	2,564	3,181	3,255
Ireland	2	2	2	77	580	890
	42	44	29	13,104	15,551	15,769
Total produce of the United Kingdom, 1861				METALLIC ZINC.		
				Tons. 3,697	Tons. 4,357	Tons. 4,415
				ESTIMATED VALUE.		
				£ 75,782	£ 89,536	£ 79,101

* The number of mines is not known.

year, as the following summary for ten years will show, is chiefly due to the ignorance and consequent obstinacy and recklessness of the working men :—

Summary of Lives Lost in the Coal Mines of the United Kingdom for the Ten Years ending 1860.

Years.	Lives Lost.
1851	1,062
1852	671
1853	755
1854	779
1855	728
1856	1,033
1857	1,119
1858	931
1859	904
1860	1,108
Total lives lost...	9,090

The mind of man is only brought under the control of reason by persevering efforts long continued. The soldier is carefully trained to act under the guidance of an individual mind. He is taught to know that his own safety, and that of those with whom he is banded, depends upon implicit obedience to the guiding head, and almost daily drill is found necessary to maintain this discipline. The hosts of miners who have to face death in other and yet more terrible forms, than appear on the battle-field, are left to train themselves to their subterranean toils, and remain untutored to the end in any of those departments of knowledge which would bring their wild impulses under the control of reason, and arm them with the means of avoiding the dangers into which they impetuously rush. I cannot, however, on this occasion venture further upon this. My purpose is rather to deal with the metalliferous mines, minerals, and miners.

I feel assured that in Nature there is no uncertainty; that the mineral veins, with all their apparent irregularity, are as dependent on some fixed law as is the motion of our satellite, and the recurrence of the tides on our shores. The Earth was given to man that he might subdue it, and brute matter, with the physical forces in connection with it, can only be brought under subjection by the influence of mind. No discovery was ever made without great labour. To work and wait is man's destiny, and unless he will bring his industry to bear on any subject, and train himself to patience, the truth will not be disclosed.

To observe correctly requires close and constant training. The senses deceive us, and, unless we are ever on the watch, our minds advance under the influence of imagination more rapidly than is consistent with the mining for truth to which we are compelled to submit. To remove mining, therefore, from the system of guesses, which now rules it, a system of method must be introduced. Education, and education of that character which is peculiarly scientific, is the only means by which we can give greater certainty to the exploration of our metalliferous rocks.

By training young miners to observe correctly, by directing their observation, and compelling them to make an exact note of every fact, however trivial it may at first appear to be, we should obtain a record of conditions which would probably in a little time guide the philosopher towards the laws by which the metals have been deposited as ores in veins. No one can deny, if he has paid any attention to the conditions of the mineral lodes, be they of tin, copper, or lead, that there are evidences of certain constants in the mode of their occurrence. This being acknowledged, why do we not at once organise the method by which more exact information may be obtained? I have been told that the miner will not be educated, and the failure of some mining schools has been brought forward in proof that knowledge is distasteful to the labourers in our mines. I am placed in the very happy position of being enabled to deny the assertion.

TIN.

Number of Mines, Quantity of Ore raised, and White Tin produced therefrom, in England, in each of the years (ending 29th September) 1859, 1860, and 1861.

COUNTIES.	Number of Mines.			Tin Ore.			White Tin.		
	1859.	1860.	1861.	1859.	1860.	1861.	1859.	1860.	1861.
				Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Cornwall	125	139	144	10,069	10,225	10,725	6,415	} 6,656	7,016
Devon	3	4	4	111	175	238	82		
	128	143	148	10,180	10,400	10,963	6,497	6,656	7,016
				Estimated Value.					
				£	£	£	£	£	£
Total..............				738,488	812,160	793,698	850,452	866,306	857,706

GENERAL SUMMARY FOR 1861.

Minerals.		Quantity.	Value.
			£
Tin	Tons.	11,640	725,560
Copper..................................	,,	231,487	1,427,215
Lead....................................	,,	90,696	1,136,249
Silver Ore	,,	29	1,471
Zinc Ore	,,	15,770	31,113
Pyrites.................................	,,	125,135	79,715
Arsenic	,,	1,450	10,875
Nickel	Cwts.	16	24
Wolfram	Tons.	8	29
Antimony	,,	15	45
Manganese	,,	925	2,925
Sundries—Gossan, Ochre, &c. ...	,,	3,016	3,016
Iron Ore	,,	7,215,518	2,302,371
Coals (sold and used)	,,	83,635,214	20,908,803
Other Minerals	,,	2,222,602	880,114
Total Value of the Minerals produced in 1861...			£27,509,525

Metals produced from British Minerals.

		Quantity.	Value.
Gold	Oz.	2,784	10,816
Tin	Tons.	7,450	910,762
Copper..................................	,,	15,331	1,572,480
Lead....................................	,,	65,643	1,445,255
Silver	Oz.	569,530	144,161
Zinc	Tons.	4,415	79,101
Iron, Pig	,,	3,712,390	9,280,975
Total Value of the above..............................			13,443,550
Estimated Value of other Metals			250,500
Coals			20,908,803
Total Value of the Metals produced, and Coals...			£34,602,853

Schools for miners were established at such a distance from the mines and the miners' homes, that it was impossible for the man who had laboured eight hours in the dark recesses of the earth, and toiled for an hour on perpendicular ladders in climbing to the surface, to attend the school. The effort, it appeared to me, should be made, seeing that the miner could not go to the school, to take the school to the miner. I have worked to this end, and organised the Miners' Association of Cornwall and Devonshire. With very limited subscriptions from the mineral proprietors and from others connected with the mines, ten classes have been established in as many mining centres. In these classes are taught, by qualified teachers, chemistry, mineralogy, mechanics, surveying, and mechanical drawing. Each of these classes is well attended by working miners, and the applications made to the Council of the Miners' Association to establish yet other classes in other districts are urgent, and, unfortunately, at present beyond the means at their disposal.

That we have to contend with the prejudices of the older miners is certain. We have, however, passed through the period of active opposition, though still we have to combat the silent repressory efforts of those whose game is speculation, and whose living depends on the uncertainty of ignorance. These must fail before that steady perseverance in a good cause, which will, I believe, distinguish the progress of the Miners' Association. So far as the experiment has been carried, it has proved a success. A most earnest desire has been manifested by the young miners to learn those branches of science which it is thought right to introduce in the classes. The utmost care is taken to avoid in every way any interference with the labours of the miner; he is only taught those sciences which are directly available to his bread-getting, and only so much of these, as appears necessary to the proper training of the miner's mind.

Experience has proved that it does not do to force knowledge of any kind on the untrained mind. It is rejected if the attempt is made, consequently the Miners' Association, having prepared its machinery, waits the invitation of those for whose benefit it is intended; and no teacher is sent into a district until a class of not less than ten members is formed, and these members agree to subscribe to the general fund. The subscriptions are small—five shillings a-year from the working miner, and not less than ten shillings a-year from the mine agent or manager. In addition to the system of class instruction, periodical meetings are held for the purpose of reading communications from the miners on the several subjects connected with the conditions of, and the working of, the mines, the mechanical appliances necessary, and the modes of preparing the ores for the market. In this way it is hoped, by slow but sure degrees, to introduce an improved system into a district where, with the tenacity of the ancient Celt, they still cling to the practices of their fathers.

That which has been done, which is now doing in Cornwall and Devonshire, may be done elsewhere. We have, it is true, mining schools at Glasgow, at Wigan, and at Bristol. I am only personally acquainted with the school at Glasgow, which progresses in a most satisfactory manner. But what are these amidst the masses of miners spread over the length and breadth of our islands. Let us examine, with as much correctness as we can, the conditions which exist.

In Great Britain there are

Coal Mines ...	3,000	employing	250,000	persons.
Iron Mines... ...	uncertain	,,	27,000	,,
Copper Mines ...	167	,,	22,000	,,
Tin Mines ...	148	,,	14,500	,,
Lead Mines ...	390	,,	21,500	,,
Zinc and others...	—	,,	1,000	,,
Making a total of	...	...	336,000	persons

actually engaged in mining operations: this is exclusive of quarries of all kinds.

Out of this 300,000 there certainly are not more than 300 under any such course of instruction as is necessary to fit them properly for the labours to which they are destined. We boast of our educational progress. We teach reading and writing in every, the remotest, corner of the land, and there we stop. We instruct our children in a knowledge of the signs by which ideas are expressed, but we leave them to gather ideas by any accidental means which may present themselves. We put tools into the hands, but we trust to chance for a knowledge of the way to use them.

I do not think it necessary to discuss further the question of the worth of knowledge to the working man. The unfortunate evidence which is constantly recurring of the loss of life in our collieries and mines, convicts us all, as a people, of great carelessness. The pyramids of Egypt were built by mere brute force controlled by a despot's hand, and guided by some master mind. Some of our vast engineering works, our railway tunnels and our railway cuttings, have been executed under the same circumstances. We have gone on trying the experiment in our mining operations, and every accident proclaims that the system does not answer. If we would save life we must educate the living in the causes of danger, and teach them the means by which these may be guarded against. The ventilation of a colliery may be the best possible, the truest science may have been brought to bear on the problem, and in obedience to exact laws, everything may have been arranged. Then, having taken all this care, having expended all this thought, time, and money, we leave it to the mercy of any individual man, out of many hundreds of ignorant men, who through their very ignorance are thoughtless, reckless.

Again, hundreds of thousands of pounds are expended annually in the exploration of our mineral districts. There is a rare—a tempting—supply of minerals in these islands. We have gold and silver, copper, lead, tin, zinc, antimony, nickel, cobalt, bismuth, uranium, chromium, and other of the rare metallic minerals, not to mention our vast stores of iron; coal beds, which are enormous, but which we are wilfully wasting, and earthy minerals of great value. The hoarded treasures are mined for by men who burrow, as does the mole, without any guiding light. The result is that mining for metallic minerals is not, on the whole, remunerative, whereas it is the expressed opinion of men whose experience entitles them to attention, and whose utterances are the result of careful thought, that no industry should yield so fair a profit if prosecuted with judgment, and carried forward with the necessary knowledge and consequent economy. It may be asked what can be done to remedy the evils which I have described? The one only remedy is a correct, a fitting education. By this I mean instruction in such truths as will serve as guiding and as warning lights. I do not dream of making miners men of science—I would avoid that superfluous knowledge which does tend, in poor, fallible human nature, to generate conceit. I would not attempt to teach mining in a school. The only school in which mining can be taught is the mine itself; but I would bring in aid of that practical teaching on which we must insist, those aids which have been afforded by the investigations of true science. At a small cost, in each mining district, schools might be cheaply established, and the means afforded for the acquirement of that modicum of knowledge which is really required. If desired, in well-selected centres, a yet higher class instruction might be given to those who had shown they had the industry and ability to deserve those larger advantages. From these, again, might be gleaned the more remarkable young men, and to them might be offered the full scientific education which is afforded by such an establishment as the Royal School of Mines.

A commission has been, during the year, most industriously at work, inquiring into the conditions of our metalliferous mines and the health of our miners. We must wait for their report, which (appear when it may)

will be a most important record of facts. Whatever may be the advice of the commission to the Government, of this I am assured:—That money will continue to be squandered in lavish expenditure on mines that are unworthy of trial; that wealth will be wasted through the errors of ignorance; that dreadful casualties will continue to horrify us; and that the miner will perish ere yet he has reached the number of his days; until we have crushed out that dark ignorance which spreads over all like a fungus, and have planted in its place some of the seeds from the tree of knowledge.

DISCUSSION.

The Chairman said he had now to invite gentlemen present to add to the interest of the valuable paper which Mr. Hunt had read, by entering into a discussion of some at least of the various important topics which had been brought under their notice. Mr. Hunt had directed their attention to a variety of subjects, and he (the Chairman) would shortly glance (for it happened that he had some practical acquaintance with mining) at one or two of those topics. The first was the importance of the subject. When they were told that the annual produce of the mines of this country amounted to between thirty-four and thirty-five millions sterling, it was impossible to over-estimate the importance of the question itself. In the next place Mr. Hunt had adverted to the uncertainty attending mining operations; he (the Chairman), however, thought that Mr. Hunt was too sanguine in his anticipations as to the power that might, at some future time, be acquired of ascertaining beforehand the nature and extent of the mineral deposits in a particular locality, and that there always must be a great amount of uncertainty. He did not mean to convey that Mr. Hunt was not right in saying that that uncertainty might be considerably reduced; but it was the fact that the mining treasures were in the very depths of the earth—that they varied from point to point even in the same vein — and that their value, though it might be approximately guessed, could not with certainty be ascertained. Still, however, that did not militate against the advice Mr. Hunt had given that science should be applied as far as possible, in lessening the uncertainty of mining operations. Mr. Hunt had also directed their attention to a subject the most important of all—that was the insecurity of life in the pursuits of mining. That insecurity arose, as they knew, chiefly if not entirely, from those explosions which occurred in collieries from what was known amongst miners as fire-damp. A few years ago they thought they had obtained security from the accidents produced by fire-damp, through the invention, by Sir Humphrey Davy, or George Stephenson—whichever was entitled to the merit, and, no doubt, both were entitled to a large amount of it—of the safety lamp. But the fact was, the loss of life had been much more considerable since the use of the safety lamp than before its introduction; and it appeared from the tables Mr. Hunt had laid before them, that the loss during the last five years had been more than in the five years previous to that time, the proportion being as 5,000 to 4,000. He did not, of course, mean to say anything so absurd as that the use of the safety lamp had increased the risk of the operatives. No doubt it had increased the power of man to work mines which could not otherwise be worked. It had in that sense, however, increased the danger, because it had strengthened the disposition of men to meet perils which had deterred them before the safety lamp was invented. It was most deplorable, and he had witnessed it sometimes himself, the extent to which human life was sacrificed in the working of mines; and though he trusted Mr. Hunt was correct in saying that with increased knowledge and increased prudence and caution they should be able much to diminish that waste of life, yet, there were elements which rendered it difficult to hope that they should ever escape without some considerable casualties in the prosecution of these operations. Still, with increased scientific knowledge and training, they might hope, at no distant time, to be enabled much to lessen this insecurity, and to afford additional safety to a very faithful, hard-working, and valuable race of men. He regretted that he was compelled, by an unavoidable engagement, to leave the chair, but his friend Mr. Hawes had kindly consented to take his place, and would preside over the discussion, which he hoped would be as interesting as the paper itself had been.

The chair having been taken by Mr. Wm. Hawes, Vice-president,

Professor Tennant said he fully agreed with Mr. Hunt in many of his statements, and he regretted to hear that there were only about 300 persons attending the mining schools out of the large number of the population employed in that industry. He was in hopes, from the great interest that Mr. Hunt had taken in promoting the education of the miner, both in Cornwall and Devon, he would have had in those two counties a considerably larger attendance at the schools he had established than was stated to be the case. He (Professor Tennant) had had the pleasure of lecturing before the Bristol School of Mines, which had been carried out with so much assiduity by Mr. Herbert Mackworth, and there he found a very useful work was being done. As to the usefulness of a knowledge of mineralogy there could be no question. About 500 minerals had already been described, and more than half that number were found in the British Isles; and to those who emigrated to our colonies, an acquaintance with these substances would be most valuable, for more than 450 of those minerals were to be found in our various colonies. Let them reflect for a moment what had been done with regard to our colonies in the last ten years. In the recent Exhibition proof was given of their vast mineral wealth, in the remarkable specimens that were shown of gold, silver, copper, precious stones, and many other substances, which it would be too tedious to enumerate. Many of these substances were discovered by the working miners who were sent out from this country. Specimens from the colonies were brought to him almost every day; and when a man of intelligence came to him, he (Professor Tennant) would throw down some minerals on the table and ask him if he ever met with them in the colony where he had been. The reply was, "Sometimes I do." "What do you do with them?" "Oh! they are not worth collecting." To which he replied, "The gold you collect is worth £4 per ounce; but these rough stones you reject are worth £50 per ounce, and, if of higher quality, they are worth £500 per ounce. They are diamonds." He believed that in many of these colonies they were throwing these things away. To come back to the mining districts of this country. It was to be regretted that much ignorance on this subject prevailed at the present day. He had, when visiting these districts, made inquiries of the captains of mines as to their knowledge of the most common substances, and they called them all "mundic;" but those substances were various in their composition. One was copper, and another iron, "mundic," but the miner could not distinguish one from the other, though a little knowledge of the use of the blow-pipe, which should be taught in all educational establishments in the provinces — especially in the mining districts — would enable those persons to distinguish one substance from another, more especially the metallic minerals. Professor Tennant then referred to various attempts to establish mining schools in Devonshire and other districts by Mr. Prideaux and others. Sir Charles Lemon endeavoured, in 1838, to establish mining schools in Cornwall, and made the liberal offer of £10,000, upon condition that the people of the district subscribed a similar sum, but that was also given up. He believed the mineral wealth of this country might be greatly enhanced by the carrying out of the schools which Mr. Hunt had suggested, and he hoped those interested in the subject would second

that gentleman's views, as he was sure it would result in economy to those who embarked their capital in mining operations. People were attracted by the glowing accounts published of mines, and were induced to take shares, and they frequently found, in the place of dividends, they were asked to pay a succession of calls. There were persons who invested a large amount of capital in mining speculations, who would not take the trouble first of all to see for themselves whether such a mine actually existed, and, in the next place, whether the specimens exhibited were actually taken from that mine, for these were often obtained from other sources.

Mr. Robert Rawlinson could not speak upon this question as a practical miner, but merely as having paid general attention to the subject. He wished to express, for himself individually, the great gratification it had given him to hear the interesting paper of Mr. Hunt, which he thought was not more eloquently expressed than soundly philosophical. The remarks as to the ignorance of the miner, he was sorry to say, applied to every district he had visited. Wherever he had to deal with these men, he was met by the ignorance and apathy which were the offsprings of the want of education. He thought, therefore, this question could not be too much urged, and the only source from which national education could spring was the Government of the nation. It was they who must take this question up. With regard to the pecuniary losses incurred in mining speculations, he would state that some years ago, whilst holding an official inquiry in Cornwall, he was brought into connection with several of the large mining adventurers of that district, and they stated it as their opinion that, if the value of all the ore mines in Cornwall, and the cost of working them were compared, the statement would stand as something like 25s. paid for every pound's worth of ore obtained. It was a serious reflection upon them as a nation that unprincipled speculators should come in and entice the public to their ruin without there being some means of protection from such frauds. The geological portion of the question was one too large for him to enter upon at this time; but he would remark that from the observations of Mr. Hunt he could see a glimmering of the light which he believed would be ultimately thrown upon the subject of the metallic formations of the earth. He was himself inclined to agree with the aqueous theory—infiltration and deposit by means of water into veins, rather than with the theory that all minerals had been fused into the veins by the action of heat. Reverting to the proverbial ignorance which prevailed amongst the great body of the mining population, Mr. Rawlinson remarked that the existence of "diviners," or "dowsers," for finding out the mineral lodes was a serious reflection upon the present age; and yet it was a curious fact, that a French adventurer, who was supposed to have been successful in finding water beds in Africa, was introduced to the government during the Crimean war, and was sent out to trace, by the divining rod, water in that locality. He fully endorsed the opinion expressed by Mr. Hunt, that it was time they woke up as a nation, and urged upon the government not to expend money upon education extravagantly, but to realise the idea that the most extravagant thing they had to contend with was ignorance, and the sooner it was eradicated the better.

Mr. James Hollow said, having been associated with Mr. Hunt in the formation of Schools of Mining in the West of England, he would express his opinion that they could be carried to a successful result. He fully concurred in the remark that after eight hours' labour in the recesses of the earth the mind was little disposed to walk a long distance to school; but that would be obviated by Mr. Hunt's suggestion to bring the schools to the miner, and, as a resident amongst that class, he was able to state they were only too glad to have the means of education brought within their reach. He was satisfied, when these schools were more widely extended, the ignorance which prevailed in the West of England would be dispelled, and the people would be led to a greater degree of research for the development of the metallic resources of the country. He would express his regret that Mr. Hunt had not given them a little more of his own views with regard to the theory of the formation of the metallic veins, upon which, from his large acquaintance with the subject, he was qualified to afford them some valuable information. As a resident amongst miners, he begged to say a word in their defence. He did not think they were altogether the ignorant and gloomy class which Mr. Hunt had designated them. He found them generally cheerful and lively above ground, whatever they might be in the solitude of the mines; and he could bear personal testimony to the fact that their feasts and social gatherings were as lively demonstrations of festive enjoyment as one could wish to witness, and were maintained with as much spirit as amongst the labouring population in any other part of the kingdom.

Mr. Robert Hunt said one or two remarks had been made on which he would say a few words, lest he should be misunderstoood. In the first instance he would refer to the remark of Sir Thomas Phillips, to the effect that he believed that uncertainty must through all time attend the exploration of rocks, simply because the minerals were buried within the depths of those rocks. Now, they did know, by the aid of experience, that there were certain laws in obedience to which the minerals were deposited. There were laws of direction, which were not without their exceptions, but they knew that where there was a deviation from one particular direction to another, there was a change in the character of the lode; and they also knew that there were certain rock conditions—as they might be called—prevailing. He would not advise any friend of his to adventure much money in a mine situated at any great distance from the junction of two dissimilar rocks in Cornwall. There appeared to be in nature a necessity for such a condition, and not merely did this prevail in the primary rocks of Cornwall and Devon, but they found the same set of conditions in the limestone or lead districts of the northern counties and elsewhere. Now they had, by experience, arrived at the indication of two or three laws by which they might be guided. They lived upon an earth which was not now in the condition in which it left the hands of its Maker. It had been subjected to vast disturbances, and those disturbances had interfered with the great general laws by which the larger phenomena had been regulated. Those disturbances would appear as exceptions to the general laws, and where sufficient inquiry was not made, these exceptions would appear as contradictions. What he required of the miners—what he hoped to see amongst them was, a careful record kept in every mine of all the variable conditions which presented themselves to the miner as he worked the lode; the variations of the rock through which he was working, the variation as regarded the direction of the lode and its underlie or dip, and numerous other points, all of which would lead eventually to the knowledge of some one great truth. No doubt, as in meteorology, they had had to wait long years before they had been made acquainted with the fact that the winds were not after all so uncertain as the old proverb declared them to be. Therefore, he was quite disposed to think they must not, with their excellent Chairman (Sir Thos. Phillips), suppose that there must ever remain that uncertainty, because there was uncertainty now. But he did believe that by a proper system of education amongst the young working miners, by leading them to record their observations, that, if the present generation did not, future generations might arrive at such truth regarding mineral deposits as might enable them to determine, while standing upon the surface of the earth, whether it was worth while to expend thousands of pounds in working it for any particular mineral lode. His friend Mr. Tennant made a remark with regard to the Cornish miners which compelled him (Mr. Hunt) to stand up in their defence. They were, he must say,

about his oldest and best friends, and he must not have them placed on too low a scale, although Mr. Hollow had said he had, in his paper, rather depreciated the character of the Cornish mine this evening. Mr. Tennant had mentioned that the mine agents were in the habit of confusing that common substance, "mundic," which was an iron pyrites, with common copper ores. Now, of the ordinary minerals, the varieties of tin and copper ores, and of lead and zinc, miners had gained by experience a very perfect and strictly discriminating knowledge; but when they came to the rarer minerals, from want of experience they were at fault; and in many instances this ignorance gave rise to a considerable amount of waste. He believed, as he had stated again and again, that a certain amount of chemical knowledge would lead the Cornish miner to an acquaintance with facts which were not clear to him now; particularly that the ores now lost, and known under the generic name of "gozans," which were peroxydes of iron accumulating upon the backs or upper parts of the lode, frequently contained considerable quantities of silver. Copper ores were known many of them to contain silver, though, at the present time, this was usually lost to the miner; and he might mention a number of instances in which the advantages of a chemical knowledge would be at once evident. With regard to the Mining Schools established, to which Mr. Tennant had alluded, the first of them in Cornwall was started by Sir Charles Lemon, who made to the county the liberal offer—not of £10,000, but of a piece of freehold ground upon which to build the college, £500 towards the building, and the sum of £30,000 to endow it, on condition that the mining adventurers of Cornwall would allow of the imposition of a tax of one farthing per ton upon all the ores raised in the county. That offer was rejected. Sir Charles Lemon, nevertheless, carried on the school for three years at his own cost, having there Professor Moseley, Mr. John Prideux, and Mr. Dickenson (the Colliery Inspector), as teachers in the several departments; but not finding the support he had expected from other gentlemen of the county, he allowed the school, after three years, to die away. It was subsequently taken up by the Royal Institution of Truro, and tried for a further period, but did not succeed, because the miners could not go the distance to the school; although Truro was the centre of Cornwall, the having to go eight or ten miles prevented the miners availing themselves of the advantages which the school offered. A third attempt was made with no better success. It then occurred to him to try the experiment of taking the school to the miners. By dint of industry and perseverance, subscriptions were obtained which did not exceed £300 a year, and with that sum two well-qualified teachers were paid, together with their travelling expenses, and certain classes had been furnished with chemical apparatus and all the materials necessary for assaying; and, as he had stated in his paper, they had now in operation between Tavistock and St. Just, in Cornwall, ten classes. He must say, in honour of the Cornish men, that greater aptitude for acquiring scientific knowledge he never met with in any men with whom he had been brought in contact. The amount of knowledge acquired by those working men, after a few weeks' study under the chemical teacher, Mr. Pearce, had been surprising, and the interest with which they pursued their studies was worthy of the highest commendation. If they could increase the amount subscribed in support of these schools, he was satisfied there would not be a district of western England without its mining school. The success of the Miners' Association was now established, and there was a great desire to receive the instruction which the Association offered—that was a knowledge of chemistry, mineralogy, mechanics, and those branches of physics which were immediately connected with the operations of pumping, ventilation, and the like. He believed he was not too sanguine in predicting that this would be found to tell most materially on the mining interests of the county of Cornwall. He had been charged with denying to the Cornish miner cheerfulness, but this he did not intend. If his words conveyed that idea he begged to correct it. What he meant to say was that there was a sort of subdued religious feeling imbuing the miner's mind. There was not that boisterous animal hilarity which was found amongst the working classes of agricultural populations. There was more deep thought, of its own peculiar character. They did not fail in cheerfulness, and as far as the other qualifications of the men were concerned he was proud to say the Cornish miner, even the most uneducated, might take a very high rank amongst the best of the working men in any portion of the United Kingdom.

The Chairman (Mr. W. Hawes) said it was now his pleasing duty to call upon this meeting to pass the usual vote of thanks to the gentleman who had favoured them with a paper this evening of unusual interest and merit. It was impossible at that hour for him to follow, with anything like detail, the whole course of that paper; but there were one or two points on which he would say a few words. In the first place, he thought they had built a great deal too much upon the ignorance, both of the miners of Cornwall and the working classes in general. It was a mistake which was very often made by a large majority of persons who found fault with the working classes for what they called their ignorance in this or that subject, whereas, looking at all the circumstances of their lives—looking to their education and the circumstances of their earlier and later life, they ought rather to praise them for the amount of information and industry they possessed, rather than to find fault with them for not coming up to a particular standard of education. He was himself rather disposed to praise the workman for what he did know, then to find fault with him for what he did not know. And he thought that was the right way of estimating the position and knowledge of the working man. Observing what had been done in the mining districts without scientific instruction, they would doubtless find that, with the addition of a little scientific knowledge, the miners would be able to prosecute the difficult operations in which they were engaged in so improved a manner as to show they had benefited by that knowledge. They had been told that a very large portion of the mining of this country was unsuccessful and unproductive. Statistics had been placed before them, from which it appeared that about 350,000 persons were employed in the production of minerals, to the value of nearly thirty-five millions sterling per annum, which gave as the production of each miner not more than about £2 per week, an amount so small that they could hardly conceive it possible that it would remunerate the large capital which was invested in these mines. He thought that was sufficient to make anybody tremble at mining operations unless they were backed by that skill and certainty of success which had been spoken of by Mr. Hunt. One word as to what were called the fixed laws of Nature and guesses as to mining. He thought it was difficult for them, with their present knowledge, to ascertain the fixed laws of Nature in the disposition of metalliferous veins through the various strata which encompassed this globe. He thought it must always be to a certain extent a matter of guess, but they must endeavour that their guess should be directed by the best information that could be obtained, and that could only be arrived at by practical experience, combined with a knowledge of the geological structure of the crust of the earth. Referring to the lamentable loss of life connected with mining, if they took the value of the coal raised and then looked at the average annual loss of 1,000 lives, it was marvellous to think that the attention of the country should have been directed to so important a subject in so slight a way. Only within the last few years had they had any parliamentary check whatever upon the mode of employment of the people engaged in these dangerous undertakings. All they could do was now being done. There was a more efficient superintendence—and

they could ask for nothing more than this; but he hoped they should ultimately have a system whereby unnecessary dangers would be reported and exposed, so that those who were employed in these operations might be prohibited to the utmost limit by legislative interference or by obligations imposed upon the owners of the collieries. Mr. Hawes concluded by moving a cordial vote of thanks to Mr. Hunt for his valuable paper.

The vote of thanks having been passed,

The Secretary announced that the next Ordinary Meeting would be held on Wednesday, the 14th January, when a paper by Mr. Samuel Highley, F.G.S., F.C.S., "On Photography and the Magic Lantern, Educationally considered," would be read. This paper will be illustrated by the Oxy-hydrogen Lantern.

THE INTERNATIONAL EXHIBITION AND FRENCH MANUFACTURES.

The Paris correspondent of the *Times* says:—

"The Paris manufacturers of bronze ornaments have returned from the London Exhibition with orders so numerous that, after having engaged all the unemployed artists and mechanics, they have found it necessary to prolong the ordinary period of work by three hours a day. The increased demand for gold and silver gilt ornaments, fine porcelain, and printed stuffs for export to Belgium, Holland, Spain, Italy, Portugal, and South America has given much impulse to all these trades. The International Exhibition has conferred immense benefit not only on the manufacturers of bronze articles, but likewise on French gunmakers, who at present export arms to the amount of 10,000,000f. annually. The Parisian shoemakers say that the English beat them in the manufacture of men's boots and shoes. It would be vain for them to deny the fact, for there are several shops in Paris established for the sale of men's boots and shoes of English manufacture. The Parisians, on the other hand, boast that none can compete with them in the manufacture of ladies' boots and shoes. They add that they export an enormous quantity to England and her colonies, to Russia, and to the far East. They export a second quality to the French West Indies, Brazil, and Chili. The 25,000 cabinet makers in the Faubourg St. Antoine pretend that no country can compete with them in the form and delicacy of the articles manufactured by them, the suitableness of each part for the purpose for which it is intended, the excellence of the sculpture, the care with which they avoid every useless ornament, of great expense but of doubtful taste, with which the produce of other countries is overloaded. They assert, moreover, that the English artists have for some time past engaged many of their best hands, and that at this moment such tools as are used in Paris are made here to be exported to London. Turkey stands first in the list of customers for the produce of the Faubourg St. Antoine; next comes Brazil, and the United Kingdom third; Russia, Switzerland, Germany, the Spanish colonies, Spain, North America, and Egypt follow in succession. These various countries absorb one-third of the produce of the Faubourg, which is estimated at 30,000,000f. annually. The paper-stainers who have fixed their head-quarters in the same industrial quarter, are known for the great taste and richness of their patterns. The value of their exports, estimated at 5,000,000f. annually, has doubled within the last 10 years. Although the number of pianos manufactured in England and Germany far exceeds those produced in France, the upright pianos exported from France exceed those from either England or Germany. In the manufacture of ribands, of which the value produced throughout France is estimated at 130,000,000f. annually, Paris comes after St. Etienne and St. Chamond. The Paris merchants, however, export a considerable portion of the produce of those towns, as well as that of Nimes and Lyons, to Great Britain, Germany, and North America. The export of ready-made clothes from France, which commenced about 20 years ago, has reached 80,000,000f. annually, of which one-fifth consists of old clothes exported by three houses who confine themselves to that trade. The principal markets for the sale of ready-made clothes are found in Algeria, Belgium, Germany, Switzerland, and Italy. The weather has, of course, much influence on the trade of Paris. Merchants and shopkeepers say that their receipts have not been so good since the present mild weather has set in as during the cold weather last month. All the small shopkeepers and hawkers who depend for a living on their sales on New Year's Day are looking forward to that period with some anxiety."

NATIONAL EXHIBITION IN TURKEY.

The following notice has been issued by the Turkish Government:—

A National Exhibition is to be opened at Constantinople on the 1st Ramazan (20th February, 1863), for three months.

Although reserved exclusively for the products of the soil and industry of the country, nevertheless agricultural and industrial machines and implements, for practical use, from foreign manufactories, will be admitted.

Manufacturers wishing to exhibit such articles will enjoy the benefit of a remission of the Customs duties.

It is well understood that the admission of foreign products will be limited to this sole category, and that a manufacturer cannot send more than one article of the same kind.

Exhibitors must, in the first place, send to the Imperial Ottoman Embassy, or to a consulate of the Sublime Porte, a duplicate list of the articles they wish to exhibit, stating the quality, quantity, and necessary dimensions, so that places may be reserved for them

The articles above mentioned, which, having been exhibited, shall not have been sold on the exhibitors' account, will not enjoy any other advantage on the part of the Imperial Government than the exemption from Customs duties.

METROPOLITAN ASSOCIATION FOR PROMOTING THE EDUCATION OF ADULTS.

The report of the preliminary meeting held on the 8th ult., for the formation of this Association, appeared in the *Journal* for the 18th of November. Since that time, frequent meetings of the Provisional Committee have been held, and the Association has been received into union with the Society of Arts. On Saturday, the 13th inst., a general meeting of the Association took place, when the proceedings of the Provisional Committee were confirmed, and the appointment of officers was made as follows:—

Vice-Presidents.

The Marquis of Salisbury, K.G.
Earl Granville, K.G.
Viscount Enfield, M.P.
The Lord Bishop of London.
The Lord Bishop of Winchester.
Sir W. Page Wood, Vice-Chancellor.
Sir Walter James, Bart.
Sir J. P. Kay Shuttleworth, Bart.
Sir Thomas Phillips.
The Venerable Archdeacon Sinclair.
Harry Chester.
H. Seymour Tremenheere.
William Cotton.
Rev. F. C. Cook, H.M. Inspector of Schools.

COMMITTEE OF MANAGEMENT.
HARRY CHESTER, *Chairman.*
THE PRESIDENT and VICE-PRESIDENTS.

A. CHRISTIE, Trinity School, Marylebone.
CHAS. CRITCHETT, Society of Arts, Adelphi.
T. N. DAY, Christ Church School, Spitalfields.
G. DITCH, St. Leonard's School, Shoreditch.
T. E. HELLER, Parochial School, Lambeth.
W. F. IVES, St. John's School, Limehouse.
REV. PREBENDARY JACKSON, The Rectory, Stoke Newington.
REV. J. LINGHAM, The Rectory, Lambeth.
REV. J. G. LONSDALE, The Sanctuary, Westminster.
F. A. McGEACHY, Shenley-hill, Barnet.
S. REDGRAVE, 17, Hyde-park-gate South.
REV. C. ROBINS, The Parsonage, Clare-market.
REV. W. ROGERS, St. Thomas, Charterhouse.
REV. J. SCOTT, Wesleyan Training College, Westminster.
W. R. SPICER, Bridge-street, Blackfriars.
E. C. TUFNELL, Lowndes-square.

TREASURER.
HENRY HOARE, Fleet-street.

HONORARY SECRETARIES.
REV. JOSEPH WALLIS, Priory-road, South Lambeth.
J. G. FITCH, Training College, Borough-road, S.

SECRETARY.
HENRY H. SALES, 9, Livermere Place, Dalston, N.E.

The following circular has been issued to the metropolitan clergy, to many employers of labour, and others interested in education:—

19, John-street, Adelphi, W.C.

SIR,—We have the honour to enclose, for your information, a report of the proceedings of a public meeting held on the 8th of November, 1862, under the presidency of Vice-Chancellor Sir W. Page Wood.

In that report you will find fully detailed the aims and purposes of the Association, and the plans which it proposes to adopt. But we desire especially to invite your attention to the following points:—

Mechanics' Institutions, Evening Schools, Adult Classes, Working Men's Associations, and Mutual Improvement Societies abound in the metropolis. They are, however, for the most part feeble and inefficient; their conductors need sympathy and assistance; and their members are without inducement to engage in systematic reading, or to avail themselves of the advantages which classes and libraries afford.

The Examinations carried on by the Society of Arts are designed to meet the latter difficulty. The Elementary, or Preparatory Examinations, which are held in the various districts, under the Local Boards, are well adapted to test the thoroughness of the elementary instruction given in the day or evening school. In the advanced examinations, which are conducted by examiners appointed by the Society of Arts—men of the highest eminence in their respective departments—are included all the branches of knowledge from which working men can derive improvement in their callings, or intelligent employment for their leisure.

This scheme of examinations has been warmly welcomed by the working classes wherever it has been brought within their reach. The number of candidates presenting themselves has steadily increased year by year; and in 1862 the examinations were held by 81 Local Boards, 2 of which were in Ireland, 6 in Scotland, and 73 in England. The prizes and certificates which the Society awards have a recognised value among the employers of labour, and have given a stimulus to many thousands of working men in their efforts for self-improvement; but from London and the neighbourhood the number of candidates has hitherto been disproportionately small.

It is a primary object of the Metropolitan Association to bring this scheme under the the notice of the working classes of London, and to make its advantages better known and estimated among them. The Committee hope to accomplish this end:—

(1.) By encouraging the establishment of evening schools and Institutions where they are needed, and by promoting the efficiency of those which already exist.

(2.) By holding public meetings for the explanation of the system of Examinations.

(3.) By establishing in every district in the Metropolis Local Boards, or Sub-Committees, through whose agency the various examinations may be brought within the reach of the working men, who cannot be expected to seek them at a distance.

(4.) By offering special prizes to those candidates of either sex who, having presented themselves from schools or Institutes affiliated to the Association, shall be successful at the Elementary Examinations.

It is to be hoped also that the Association will be able to encourage physical and industrial training among adults; and, by means of readings and lectures, to promote their innocent recreation.

In these undertakings the Committee would thankfully welcome your help as a donor, annual subscriber, or fellow worker; and they now request permission to add your name to the list of members. They will be glad if you will place them in communication with any evening school, or adult class, in which you may be interested; or if in any way you will give them the advantage of your sympathy and support.

Mr. Sales, the Secretary of the Assseiation, will afford any further information you may desire, and is authorised to receive subscriptions and the names of members. Subscriptions may also be paid to the Treasurer, at Messrs. Hoare's Bank, Fleet-street.

We are, Sir,
Your faithful servants,
JOSEPH WALLIS, } *Hon. Secs.*
J. G. FITCH, }

December, 1862.

The support of all those interested in the advancement of education is invited.

Home Correspondence.

MR. TAYLOR'S PAPER ON LABOURERS' COTTAGES.

SIR,—When presiding, on Wednesday last, at the reading and discussion of Mr. Taylor's paper "on the construction of labourers' cottages," &c., I stated that Mr. Peabody had directed his munificent donation of £150,000 to be devoted to similar objects. Having since entertained doubts on this point, I have conferred with that gentleman, and learn from him that, though he speaks in his letter to the trustees of the fund, of the application of the money, "or a portion of it, to the construction of such improved dwellings for the poor of London, as may combine in the utmost possible degree the essentials of healthfulness, comfort, social enjoyment, and economy," he by no means intended to limit them to this precise field of operation. On the contrary, he left his trustees quite at liberty to choose any mode or modes of giving the most substantial effect to his wishes, subject only to the wise provision that no "influences calculated to impart to it or them a character either sectarian as regards religion, or exclusive in relation to local or party politics," should at any time be permitted to operate.

I have reason to know that these gentlemen sympathise largely with Mr. Peabody in the foregoing suggestion.

I am, &c.,
THOS. WINKWORTH.

Gresham Club, Dec. 17, 1862.

SIR,—The paper read on Wednesday evening last, together with the discussion thereupon, give a very poor

estimate of our capabilities in this line, and scarcely touch upon some of the real difficulties of the case, the apparent object being to cause an impression to be made upon the public mind that none but patented articles should be used in building cottages and tenements for the industrial classes, and that we must, in future, entirely abandon the old fashioned materials of good bricks and mortar, once supposed to be both the cheapest and most essential ingredients required for house building.

The foremost difficulty in the way is that of ground rent, which must, by some means or other, be entirely got rid of before we can expect to have substantial buildings, either for rich or poor, for every owner of a house or cottage ought to be the freeholder of the land it stands upon. Ground rent is the primary cause of the wretched courts and alleys with which our towns and cities are so much infested, as well as of the filthy pig-sties, designated labourers' cottages, spread broadcast over the rural districts. Rich and noble owners of land in towns and cities will not deprive themselves of a large portion of their revenues derived from back-slum settlements, for the substantial reason that, in consequence of the fearful density of the inhabitants, such tenements yield, in the aggregate, a much larger rental than handsome rows of good houses, occupying the same amount of ground.

An ingenious plan has, of late, been devised, in order to overcome, in some measure, the great difficulty of exorbitant ground rents. It is to pack about twenty families, or an average of one hundred human beings, one upon the other, like herrings in a barrel, upon a plot of ground fifty feet by thirty, whereby each individual receives, as his allotment, only fifteen square feet of the earth's surface, or five feet by three, from which has to be deducted all the passages, staircases, and other unoccupied portions. Such an arrangement for the accommodation of the industrial and poorer classes is equally dishonest and improvident.

Another difficulty lies with the existing patent laws, which almost preclude the possibility of making use of any non-patented materials, for no exclusive privilege can be obtained for the manufacture of such common things as bricks and mortar, however good, and they are therefore produced at the lowest standard of quality that will command a sale. If bricks are to be kept in stock any time, it is found necessary to house them, for fear of their melting away, and fine red bricks for facings are generally so soft that they are merely rubbed gently one upon the other to make them fit into their intended situations.

The result is self-evident, that when we wish to construct damp-proof buildings, recourse must be had to some patented material or manufacture, and that if it were not for the patent laws, common bricks would be made damp-proof, as well as lime mortar, much superior to many patent cements, which are most extensively adulterated, and, though they harden, never adhere. There is clay in abundance all over this country fit for making non-absorbent bricks, but unless some trickery be introduced into the manufacture, so as to acquire exclusive rights, no one will take up the business. Again, if common lime be found fit for making damp-proof concrete, surely there can be no difficulty in making damp-proof mortar.

It is, however, of little consequence, as nobody in this country builds for a permanence, and it cannot be expected that any unnecessary expense will be incurred for the purpose of obtaining good and durable materials. The worst bricks and poor lime are the rule, and the mortar is made up of the rubbish out of the foundations, so that long before the lease is run out, the house, or cottage, as the case may be, has to be partially rebuilt; and our homes are perpetually damp, because the walls are built of sponge.

I have formerly explained in this *Journal* that all over Italy water-proof walling may be seen built with the common bricks and mortar of the country, but good of their kind. I have myself had vats built of four-inch brickwork, of the capacity of over one thousand cubic feet, which never exhibit the slightest damp outside from the water or liquor contained within.

There is abundance of limestone in many parts of this country, which, with good sand, naturally forms proof mortar, but nobody will use it because it is not a patented article.

The design also presents another obstacle, for we apply most erroneously to first-rate architects, or have recourse to premiums and rewards; whereas the designs, to be appropriate, must be made by persons of their own class, who are well acquainted with their peculiar habits and customs; and the best model cottages will be produced by laying down certain conditions before any intelligent country builder—for they, as a body, are no way inferior to their London brethren, and for rural works are much superior—and leaving him free to carry out his plan in his own way.

Palatial residences for the poor, as now building in London, are outrageously inconsistent; every room, not a passage, of a complicated double *trapeze* form, with no proper place for a bedstead; patent fireplaces in every out-of-the-way corner; washhouse *inconveniences*, 6 feet by 4, boiler and patent stove-grate included; no outlet of any kind except the front door, up four pair of stairs, and patent air-traps, or rat-holes, running through the entire building. Such monstrosities are purely the offspring of the patent laws and patentees, of whom not one in a hundred make a cent by their patent-right privileges, though their lawyers may, perhaps, to some considerable extent. The proposal to make the poor wife bleach her linen on a London house-top, seems to be most absurd.

A distinction must of course be made in building cottages for the industrial and the poorer classes in towns and the country. With the latter the rule is, single or double cottages, or rows of cottages, with each a small separate plot of garden-ground; but town residences for the poor should be built on the plan of small pieces of towns, complete of themselves, with proper streets, churches, chapels, and institution or club buildings, and each tenement having its own separate yard and common drying-ground. In no case, however, should these tenements be more than two stories high, because the labour of going up high flights is a terrible and profitless waste of human strength.

If it be objected that the high rate of ground-rents in towns and cities forbids, let an end be put to ground-rents by the purchase of the land, not out of rates, but with public moneys, for the country at large would be greatly benefited, and the parish rates much diminished, by lodging the industrial and poorer classes in simple but commodious and healthy buildings.

I need not allude to another endless source of evil—the inequality of rating in different parishes. I contend, with Mr. Stones, that our poor belong to no parish, and that the rating to the poor should be the same in every parish in the kingdom. I am, &c.,

HENRY W. REVELEY.

Poole, December 15, 1862.

Sir,—Having read Mr. Taylor's paper with considerable interest, and the account of the discussion which followed on Wednesday evening last, reported in your *Journal* of Friday last, more particularly respecting the cost of erecting labourers' cottages, allow me to forward you the following particulars of a pair of cottages which were erected from my drawings and designs about a year since, at Orpington, for £180 per pair.

These cottages each contain four rooms:—A kitchen or living room, 14 feet by 12 feet; scullery, and two bedrooms—the larger room 14 feet by 12 feet—and lobby porch between the living room and staircase.

There is in the scullery a larder, sink, pump, copper, closet for coals or wood; in the principal room a cupboard, dresser, and range with oven and boiler.

The roof over the cottages runs from end to end, and is V-shaped and of cruciform plan, there being a gable in the centre, higher than the other roof, with two chimney stacks on each side. These roofs are covered with slates.

The design is of a picturesque Gothic style, the walls constructed of variously-coloured bricks. To avoid the upward ascent of damp from the earth, a layer of slates, bedded in cement, has been introduced a few inches above the surface of the ground. I am, &c.,

JAMES G. STAPELTON, JUN.

62, Cannon street, City, E.C.,
December 15, 1862.

Proceedings of Institutions.

ASHFORD, SOUTH-EASTERN RAILWAY MECHANICS' INSTITUTION.—The report of the Council for the half-year ending September 30th, 1862. being the thirtieth, says that the funds of the Institution are in a very satisfactory state, there being a balance in its favour—to enable it to continue its system of class instruction, further spoken of in another part of this report, and to add new and useful works to the library—of nearly £75; the sum of £64 2s. 9d. having been added thereto by the workmen's excursion to London to view the International Exhibition, kindly granted by the directors of the South-Eastern Railway Company, to whom, and all who have assisted to promote the prosperity of the Institution, the Council tender their sincere thanks. The number of members has fallen during the half-year from 180 to 164, being, however, four more than at this time last year; and considering that the Council refused to admit as members persons unemployed by the Railway Company, until the question whether such ought to be permitted to join the Institution had been settled, which was done towards the month of August, and in their favour, but limiting their voice in the Council to one representative, and that it has been customary for the number of members to decrease during the summer half-year, then the present number relatively is not unsatisfactory; but when the number of persons employed in the works and the advantages offered by the Institution are taken into account, we might reasonably expect to see it considerably increased. At the last half-yearly meeting it was resolved, that a general meeting of the members should be called for the purpose of considering the propriety of revising the rules of the Institution. The meeting that assembled in accordance with that resolution unanimously declared that the rules required amending, and appointed a Committee of six to make such alterations in them as they might think requisite. The alterations made by this Committee were posted in the reading-room for one month, together with a notice convening a special meeting of the members on August 27th, to which the Committee submitted their amended rules, when, with a few alterations, they were adopted and made the laws of the Institution. During the half-year the Council appointed two of their body to assist the Librarian in making a thorough inspection of the library, when such books as were found in a dirty and tattered condition were removed and new ones substituted, and a few that had been lost were replaced. Several magazines and other periodicals taken in monthly parts, have been bound up and placed in the library, and the Council contemplate a further addition very shortly. The number of volumes now in the library is 1,179. There has been about the usual attendance in the reading-room, and no alteration has been made in the papers laid on the table. The Council, deeming it advisable that the instruction by classes (which of late years has formed a prominent feature in the working of the Institution), should commence as near the beginning of the ensuing half-year as possible. are endeavouring to form classes in arithmetic, English grammar (including orthography and composition), mechanical and free-hand drawing, separately, and under different teachers, and French, each class to consist of not less than eight members, who will be required to pay 1s. 6d. per quarter, in advance, to join the class in mechanical drawing, and 1s. 6d. per quarter to join either of the others. The Council have also made arrangements for the members to attend, gratis, the lectures and entertainments given in connection with the Ashford Mechanics' Institution during the winter. The Council are pleased to report that five of the six members who underwent the Society of Arts' Examination, last May, were successful. To these the Council of the Institution have awarded prizes of books, according to the scale agreed upon at the corresponding half-yearly meeting last year. The chess club recommenced holding its weekly meetings on the first Monday of September, and the attendance thus far leads to the supposition that it will equal, if not surpass, any season since its establishment.

MEETING FOR THE ENSUING WEEK.

SAT.... ..Royal Institution, 3. Professor Frankland, F.R.S., "On Air and Water." (Juvenile Lectures.)

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

Dated 25th November, 1862.

3158. T. Robertshaw and L. Robertshaw, Bradford—Imp. in the manufacture of textile fabrics, technically called "Moreens."

3164. G. Ranson, Eccleston, Lancashire—Imp. in apparatus for preparing clay for brick making and other purposes.

Dated 26th November, 1862.

3168. T. Fletcher, Rochdale—Imp. in the construction of rollers, cans, spools, and bobbins, and in the machinery employed therein.

3170. J. Steinthal, Abbey Hey Works, Gorton, near Manchester—An improved moulder's blacking.

Dated 27th November, 1862.

3178. F. W. Hartley, 55, Millbank-street, Westminster—Improved means of obtaining certain products resulting from the manufacture and purification of coal gas.

3180. W. T. Rowlett, Leicester—Imp. in machinery used in producing knit or looped fabrics.

3184. W. Clark, 53, Chancery-lane—Imp. in the preservation of animal and vegetable substances. (A com.)

INVENTION WITH COMPLETE SPECIFICATION FILED.

3198. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the construction of clocks or time-keepers. (A com.)—29th November, 1862.

[*From Gazette December 12th*, 1862.]

Dated 28th July, 1862.

2134. W. Maugham, Prospect-place, Wandsworth-road—Imp. in the manufacture of effervescent beverages.

Dated 8th October, 1862.

2720. M. A. F. Mennons, 24, Rue du Mont Thabor, Paris—Imp. in self-inking hand stamps. (A com.)

Dated 13th November, 1862.

3053. A. Twaddell, Glasgow—Improved arrangements for dressing or sizeing warps.

3057. J. Slack, Manchester—Imp. in nursery swings and cots.

3059. W. E. Gedge, 11, Wellington-street, Strand—An improved machine working by compression and expansion of air. (A com.)

3063. R. A. Brooman, 166, Fleet-street—An improved means or apparatus for shunting trains. (A com.)

3065. C. G. Kopisch, Bishopsgate-street Without—Improved apparatus for propelling, steering, and ventilating vessels.

Dated 14th November, 1862.

3266. E. S. Cathels, Shrewsbury—Imp. in apparatus used in the manufacture of gas.

3067. E. B. Wilson, 5, Parliament-street, Westminster—Imp. in the method of conveying air, steam, gases, and fluids to oscillating or vibrating cylinders and vessels, and in the apparatus employed therein.

3069. S. Roberts, Sheffield—An imp. in frames for containing stoppered bottles and jars.

3071. V. J. Gassaignes, Gavundum, France—Imp. in stereoscopes.

Dated 15th November, 1862.

3073. J. S. Clegg and J. Slater, Oldham—Certain imp. in carding engines.

3075. E. Kirby, Birmingham—A new or improved pulley for tightening the cords of window and other blinds.

3079. E. H. Duru, Poitiers, France—An improved motive power engine.

3081. W. H. James, Old Kent-road—Imp. in steam engines.
3082. J. Wilson, 2, Royal Exchange-buildings—Imp. in hydraulic pumps. (A com.)
3083. G. Gray, Greenwich, Kent—Imp. in the manufacture of wheels.

Dated 17th November, 1862.

3085. C. Binks, Parliament-street, Westminster—Improved methods of obtaining oxygen and chlorine gases.
3087. W. Dobson, Nottingham—Imp. in lace dressing frames employed in the dressing of lace or other fabrics.
3089. W. Williamson, 133, High Holborn—Imp. in washing, wringing, and mangling machines.
3091. G. Richards, Caroline-street, Bedford-square—Imp. in the construction of ordnance and fire-arms, and in the projectiles to be used therewith.

Dated 18th November, 1862.

3093. J. Arbos, Barcelona, Spain—Imp. in generating certain gases for lighting and heating, and in apparatus employed therein.
3095. W. H. Burnett, Margaret-street—Imp. in the mode of working telegraphic lines, and in instruments and apparatus employed for telegraphic purposes.
3097. C. W. Harrison, Lorimer-road, Walworth, Surrey—Imp. in looms for weaving.
3098. C. Neild, Cheadle, Chester, and J. Hopkinson, York-place, Manchester—Imp. in fire alarums and indicators of temperature.
3099. R. Brown, Birmingham—Imp. in warming and ventilating, more especially applicable to buildings, carriages, and ships, and in apparatus to be employed for that purpose.
3101. R. Beck, Peartree-cottage, Upper Holloway—Imp. in reading glasses and magnifiers to be simultaneously used with both eyes.

Dated 19th November, 1862.

3103. L. Lenzberg, 492, Oxford-street—Imp. in the apparatus for raising and lowering Venetian and other blinds.
3107. S. S. Brown, Ellesmere Works, Runcorn, Cheshire—Imp. in the manufacture of elastic fabrics or garments.
3109. R. A. Brooman, 166, Fleet street—Imp. in tubular boilers, condensers, and superheaters. (A com.)
3111. J. B. Edmondson, and J. Carson, Manchester, and J. Blaylock, Carlisle—Imp. in machinery for printing, numbering, and dating railway and other tickets.
3113. G. A. Buchholz, Montague-place, Clapham-road, Surrey—An improved mode of manufacturing semolina and flour, and in apparatus to be employed in such manufacture.

Dated 20th November, 1862.

3114. J. T. Hutchings, Inkermann-terrace, Charlton, Kent—Imp. in the construction of waterproof boot and shoe soles.
3115. J. Jewsbury, Kinver, Staffordshire—An imp. or imps. in machines for raising weights, which imp. or imps. may also be applied to lathes.
3117. G. W. Oldham, Moll Spring, Honley, near Huddersfield—Imp. in preparing and dyeing silk waste, flax, hemp, Indian or China grass, or other similar fibrous substances.
3119. R. A. Brooman, 166, Fleet-street—A method of, and apparatus for, indicating and recording the course of ships and vessels. (A com.)
3121. F. Seiler, 2, Thavies-inn, Holborn—Imp. in motive power engines, and in apparatus for conveying and distributing motive power.

Dated 21st November, 1862.

3125. W. Sinnock, Nicholas-lane—Imp. in the treatment and combination of fibrous and other materials, and in the arrangement of apparatus for manufacturing the same.
3127. J. Townsend, Glasgow—Imp. in damping and preserving vegetable substances, and vegetable and other textile materials and fabrics.
3135. G. G. Sanderson, Park-gate Iron Works, Rotherham—Imp. in armour for fortifications and floating and other batteries.
3137. C. A. Orth, Church-road, De Beauvoir square—Imp. in apparatus for obtaining and applying motive power.
3139. A. Sutton, Rue Boursault, Paris—An improved construction of time indicator for public vehicles and other uses.

Dated 22nd November, 1862.

3141. W. E. Nethersole and C. Buckland, Swansea—Improved safety signals for fire-arm practice.
3143. C. De Bergue, Manchester—Imp. in machinery or apparatus for the manufacture of metal reeds for weaving.
3145. W. Clark, 53, Chancery-lane—Imp. in candle-lamps. (A com.)
3147. J. Webster, Birmingham—Imp. in the construction of burners and blow-pipes.

Dated 24th November, 1862.

3152. J. Barclay, Vulcan Foundry, Kilmarnock—Imp. in the construction and arrangement of rollers to be used in machinery for printing textile materials or fabrics, and in apparatus for drying and finishing the said materials or fabrics.
3153. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in burnishing metal surfaces, and in the machinery or apparatus employed therein.

Dated 25th November, 1862.

3157. J. Moule, 15, Seabright-place, Hackney-road—An improved method of deodorizing mineral oils and hydro-carbons.
3159. A. L. Woolf, Birmingham—A new or improved metallic alloy.
3160. E. Wadsworth, Macclesfield—Imp. in machinery used in the manufacture of certain descriptions of braid.
3163. G. Henderson, 7, Mincing-lane, London—Imp. in steam engines. (A com.)
3165. A. V. Newton, 66, Chancery lane—Imp. in sewing machines. (A com.)
3167. T. M. Elton, St. Luke's Soap Works, Golden-lane, Barbican—Imp. in the manufacture of soap, and in the machinery employed therein.

Dated 26th November, 1862.

3169. J. Aspell, and E. Booth, Middleton, Lancashire—Certain imp. in looms for weaving.
3171. F. Palling, Esher-street, Upper Kennington-lane, Surrey—An improved fountain penholder.
3172. J. F. Foveaux, Strand—Imp. in apparatus for pulverizing or dividing liquids into spray. (A com.)
3173. W. Austin, Furnival's-inn-place, Holborn—An improved material for the manufacture of cartridge cases, applicable also for tubing and various other useful purposes.
3175. A. V. Newton, 66, Chancery-lane—An improved mode of preparing oxide of zinc as a pigment. (A com.)

Dated 28th November, 1862.

3188. J. T. Caird, Greenock—Imp. in steam engines.
3190. F. Boecke, Berlin—Imp. in sewing or uniting fabrics, and in the machinery or apparatus employed therein.
3196. J. Adams, Bridgehouse, Bow, and C. White, King-street, Regent-street—Imp. in apparatus for boiling and evaporating

Patents Sealed.

[*From Gazette, December 12th*, 1862.]

December 12th.

1785. S. H. Huntly.
1789. A. W. Makinson.
1808. R. Stansfield & J. Dodgeon.
1816. J. B. T. Detuncq.
1822. J. W. Taylor.
1825. A. Warner.
1832. H. Davenport and J. Davenport.
1849. A. Ripley.
2762. F. G. Grice.

[*From Gazette, December 16th*, 1862.]

December 16th.

1799. J. Warren.
1828. F. E. Schneider and J. Snider, jun.
1831. G. Simpson.
1836. A. F. Maigron.
1837. J. H. Redstone.
1842. T. Wilson.
1846. A. Webster.
1848. R. Cook.
1862. W. Clark.
1871. W. Clark.
1923. W. E. Newton.
1924. E. de Labastida.
1939. W. A. Gilbee.
1951. O. F. Bystrom.
1998. W. Ashton.
2298. M. A. F. Mennons.
2337. G. Davies.
2386. M. A. F. Mennons.
2387. M. A. F. Mennons.
2516. J. Rowell.
2845. H. Wilde.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, December 16th*, 1862.]

December 9th.

2808. I. L. Bell.
2809. J. Chatterton & W. Smith.
2813. R. Emery.
2828. J. R. Johnson and J. S. Atkinson.
2832. S. C. Lister and J. Warburton.
2846. G. Hawksley.
2860. W. H. Harfield.
2876. R. P. Busk & T. Greenwood.
2901. R. S. Howden & E. Thresh.

December 10th.

2814. J. R. Breckon & R. Dixon.
2862. E. P. Holden.

December 11th.

2818. G. C. Watson.

December 12th.

2831. W. Robinson.
2833. J. H. Dickson.
2838. G. Bedson.
2839. G. Leach.

December 13th.

2842. A. Leslie.
2847. W. R. Crocker.
2867. R. Morrison.
2904. J. Ferrabee.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, December 16th*, 1862.]

December 9th.

2785. P. A. le Comte de Fontainemoreau.

December 12th.

2894. J. Murdoch.

LIT OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No.	Date of Registration.	Title.	Name.	Address.
4528	Dec. 1	Columbian Steam Cooking Table	Smith and Wellstood	Glasgow.
4529	,, 4	A Billiard Marker	W. Burroughes ... ... / F. Watts	Soho-square, W.

Journal of the Society of Arts.

FRIDAY, DECEMBER 26, 1862.

NOTICE TO MEMBERS AND INSTITUTIONS.

Exhibition Catalogues.

Her Majesty's Commissioners for the International Exhibition of 1862 have placed at the disposal of the Council, for distribution to the Members of the Society and Members of the Institutions in Union, copies of the Industrial and Fine Art Catalogues.

Members of the Society desiring to have copies of each of these Catalogues may have them on application, either personally or by an authorised agent, at the Society's House.

Secretaries of Institutions in Union may have a number of copies placed at their disposal for distribution amongst their Members, on making a similar application, specifying in all cases the number required.

General Index.

A general Index to the first ten volumes of the *Journal* will shortly be published, which may be bound with the last volume. Members who desire to have copies (which will be supplied *gratis*) are requested to apply to the Secretary as early as possible, in order that a sufficient number may be printed.

EXAMINATIONS, 1863. — NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The attention of Secretaries of Institutions and Local Educational Boards is specially called to the following extract from the programme of examinations for 1863:—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1863. In some cases the Local Educational Boards comprise such large districts, that, for the convenience of the Candidates, Branch Local Boards have to be formed within the districts. Whenever this is the case, the names and addresses of the members, both of District Board and of its Branch Boards must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

AWARDS OF MERIT AT INTERNATIONAL EXHIBITIONS.

In August last the Council of the Society of Arts issued a letter, inviting the opinion of the Jurors, the Commissioners for the Colonies and for Foreign countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and requesting replies to the questions given below, with the intention of embodying the answers in a public report.

AWARDS OF JURIES.

1.—Are you of opinion that Awards for Merit, by medals or otherwise, in International Exhibitions, are desirable?

2.—State the reasons for your opinion.

3.—Ought Works of Fine Art and Designs to be excluded from the awards?

4.—Can you suggest any better method than the appointment of jurors for making the awards?

5.—Can you suggest any improvement in the constitution or proceedings of the juries?

6.—Is any appeal from the decision of the juries desirable?

7.—If you think awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?

8.—Have you any further suggestions to offer on the subject?

The following is a summary of the replies received. The figures attached to the replies correspond with those of the questions:—

Major-General Sir Frederick Abbott, K.C.B. Juror, Class XI., Sects. A. and B.—1. Yes. 2. They bring into notice excellencies of invention. 3. Would exclude fine arts. 4. Approves of juries. 5. Can suggest no improvement. 6. No appeal.

S. D. Addiss, Exhibitor, Class XXXIV.—1. No medal, but a report by a jury; see 4 and 5. 2. The public are the best judges. 4 and 5. Trade societies should select a jury of practical workmen, to be divided into classes, associated with independent gentlemen, to take the reports of such jury. 6. Appeal necessary, and gives his own case as an instance of the necessity. 8. A permanent exhibition would be more useful.

Alexander Andrews, Commissioner for Western Australia:—1. I am of opinion that awards for merit in the shape of medals are not desirable. 2. Because, in the present advanced state of manufactures in this country, there are so many houses who can arrive at the same amount of perfection, and can produce the same article of equal merit, that the award of a medal to any two, three, or even more, of them becomes an invidious, and, I may say, an unfair distinction. 3. Most decidedly; especially works of fine art, because it is so difficult to arrive at unanimity of opinion as to merit, there being no arbitrary rule generally recognised. 4. None. From what I have seen of the working of the jury system in connection with the present Exhibition, it has been, on the whole, excellent. More attention might be paid to the constitution of the juries, in the more careful selection of working jurors, for many members of the juries have paid little or no attention, although the great majority have been indefatigable, and, I believe, thoroughly conscientious in the discharge of their duties. 5. None other than suggested in the reply to query No. 4. 6. Most decidedly not. An appeal to any other quarter would open the door to much jealousy, and even give grounds for suspicion, however unfounded, of an undue influence being brought to bear, of favouritism, &c., &c. Moreover, it would make the jurors themselves less careful, and, on the whole, I think entirely undermine the system. 7. A report on the several sections and classes, specifying the most meritorious exhibitors and the particular points of merit (whether of quality of material, beauty of design, excellence of workmanship, general utility, cheapness of manufacture, or purity of quality, strength, &c., &c.,) which could be quoted by the successful competitors, would, I should think, be more esteemed than a medal.

8. I would add that these queries appear to me to affect more particularly articles of manufacture, and do not apply so much to raw products from the colonies, of which there may be only one or two exhibitors of each kind.

Charles Aubin, Exhibitor.—1. Not desirable unless fairly given. 2. Juries cannot understand hardware; inferior work has been rewarded; this is an injury to many. 3. If medals are given, works of art should not be excluded. 4. Jurors should choose workmen to assist. 5. Jurors should be well paid, and sworn. 6. Appeal desirable. 7. Awards undesirable unless given by practical workmen. 8. As regards 1862, if there had been no medals there would have been more satisfaction.

Thomas Bazley, M.P., Chairman of Jury, Class XVIII. —I think the appreciation of the public is the best reward which the exhibitor of any article can obtain. Juries I regard as superfluous. A good classification with a perspicuous arrangement would, in my opinion, most effectually facilitate the formation of a correct estimation of the merit of all articles displayed.

Dr. Beeg, Royal Commissioner for Bavaria, and Chairman of Jury, Class XXX.—In regard to the questions put by the Society for the Encouragement of Arts, Manufactures, and Commerce, in the circular of the 8th of August, I take the liberty to state my opinion briefly as follows:—1. The aim of the jury awards is to signify the merits of exhibited articles to the public, recommending them by this, so that the exhibitor gets honor and material profit by it. This aim is often, but not always, attained, because, 2. The present organisation of juries, mode of judging, and some influencing circumstances prevent it. The number of articles at the International Exhibition to be judged is so numerous that the most indefatigable zeal of the juries can hardly master them; the circumstances which must be taken into consideration are very often but imperfectly known, and this is partly the fault of the exhibitors themselves or their agents; the time which is allowed for judging is so limited, that even with the most sincere desire for justice and impartiality, it is nearly impossible to give in every case a correct judgment, to examine everything, and to consider every circumstance. On the other hand there are many exhibitors who manufacture specially for the Exhibition, articles not destined for the market and universal trade, on which no correct opinion can be formed. The result of these unfavourable circumstances is, that very often awards are given where they are not deserved, and in other cases they are not given where they ought to be, either by an oversight or error in judgment. Thus the awards lose the intrinsic value they should have, as the public put no confidence in them, and the exhibitors are not satisfied. Even such exhibitors as have got an award put sometimes less value on it when they see that one of their competitors, whose merits they very well know, remains unrewarded. I could name examples if it were not unnecessary, as everybody knows them. It is certainly impossible to make an arrangement of juries which in every case perfectly answers every wish; but there might be some alterations which, in my opinion, would improve in some degree the constitution of juries. I shall state them at once, answering Question 3 further on. 4, 5. There must be juries at exhibitions, otherwise a great inducement to exhibit and the encouraging character of the exhibition would be lost. We must first of all settle one most important question in regard to International Exhibitions. Are the exhibited articles to be judged without reference to the countries whence they come, the circumstances under which they are produced, or is it allowed to view them relatively? At the present exhibition the former view was prescribed; but I dare say it was quite impossible to obey strictly this rule, otherwise the majority of exhibitors from colonies or countries in which industry is not fully developed would have got no awards at all. But I am sure no one will say that an exhibitor, who has, on account of the unfavourable state of his locality, to overcome many and great obstacles, who is the pioneer of civilisation and industry in his town or country, does not deserve an encouraging award, although his exhibition falls short in merit, compared with the works of an exhibitor from a country arrived at the highest point of development. Should the first view be adopted, that only articles of the highest merit, without any relative consideration, should have awards, then all countries in an inferior state of industry are nearly excluded from competition. If, on the other hand, the circumstances of country and state of civilization are to be regarded, the difficulties of judging are materially increased; notwithstanding this, I am inclined to take the latter mode. The organisation of juries which I think advisable will answer for both, but particularly for the latter. *a.* Each manufacturer who exhibits, proves by this that he is enterprising and striving to gain public attention; he is rewarded for this by a commemorative medal, which he may make use of in any way he likes. One of his purposes, that of making himself more publicly known, is obtained by this. *b.* Awards are only given for progress displayed by the exhibitor, be it in the perfection of his articles, new inventions, new processes, or greater economy of production, great increase of his business, first introducing the manufacturing of certain articles in certain countries, &c., &c. *c.* Awards for such progress must be claimed, for the exhibitor has to show his progress in a sufficient manner, and to send in his claims before the commencement of the Exhibition, which are to be examined by an international commission. *d.* The International Exhibition Jury is formed according to the classification of the said claims, made by the commission, and in proportion to the number of claimants, from the different countries.— This system has already answered well in Wurtemburg, where they give progress medals at their annual exhibitions. It diminishes the labours of the juries in a remarkable way; gives a sure criterion in judging; allows a careful investigation; prevents oversight; has an encouraging character; and secures, indisputably, a high value to the awards. Can such a system be adopted or not? It should be, if possible. *e.* The working of the juries should not begin earlier than some months after the opening of an exhibition, when the arrangement of the articles is wholly complete, the catalogue corrected, and everything in order. *f.* The jurors should not only be men perfectly understanding their task—which they really generally have been—but determined to apply their time to the work, and not to leave the labour to but few of their colleagues, which sometimes has been the case. *g.* The jury-work ought not to be hurried, although it is advisable to fix a certain time for the performance of it. *h.* After the work is done and the jury dissolved, a commission should be formed, consisting of one member of each jury-class; this commission should take care that formal faults and errors in the printing of the jury-awards are properly corrected, but without being empowered to alter the jury decisions in any material way. *i.* The foreign commissioners should be consulted in regard to the exhibitors belonging to their countries. *k.* The jury-awards should not be published earlier than at the close of the exhibition. *l.* There should be different degrees of awards. In regard to the formal way in which the jury-work should be done, I take the liberty of describing the mode in which the jury of Class XXX. has acted, of which I have had the honour to be chairman at the present Exhibition. After the jury had daily assembled at a certain fixed time and place, it began the examination of the articles, conducted by one of the jurors, who had previously made himself acquainted with the class. The jury secretary had a number of papers on which he marked the number of the visited article and short remarks made in inspecting it, one leaf for each article. After about three hours' examination the jury went to an office to compare notes and to fix awards. The secretary took one leaf after an other of the inspected

articles; the proposition of reward or not rewarding was made by the juror (or a juror) from the country from which the article in question had come. Thus, an Englishman proposed for the articles from the United Kingdom, a Frenchman for the French, and where the country was not represented in the jury the chairman proposed. In most of the cases there was unanimity of opinion and according to the notes made individually at the inspection; where it was not so, a show of hands decided. The secretary noted the decisions in case of award on the respective leaf, and wrote the minutes after these, which were read the following day. At the end these note-leaves were arranged in packages; each country had its own package, containing separately the leaves noted with medals or honourable mentions, or with no award. By this means it was possible to ascertain immediately if any article had been inspected or overlooked. Certainly every jury is at liberty to arrange its proceedings as it thinks proper, but it seems advisable to propose a method which has already answered well. 6. The decisions of the juries must be unalterable, and therefore no appeal to revise them should be allowed. To avoid formal faults, it is necessary to have the jury reports and lists of awards carefully looked over by the acting commissioners (home and foreign), as I have already remarked. The Commission could even remain till about some weeks after the publication of prizes to investigate any blunder pointed out by the press or in any other quarter; but, I repeat it, only formal ones, not altering the jury-decisions, for if the latter are wrong in some cases, the responsibility rests only with the juries. 7 is already partly answered. I think juries and the awarding with prizes cannot be abolished without endangering the character of exhibitions, and depriving them of one of their most attractive inducements. Public reports alone would not suffice. We all know what a system of puffing is very frequently going on, and if the commission would instal impartial reporters, why, then, it is nothing but a kind of jury. I am for juries and awards. I think it advisable that works of Fine Arts should not be judged by juries; articles of industry are subject to the judgment of the public, because they are objects of common use and trade in general; works of Fine Arts are judged by individual taste, and it would be very difficult to find jurors who are universally regarded as authorities. The competition of artists is quite another thing to that of industrial manufactures. It is even a question if exhibitions of works of Fine Arts should not be kept entirely separate from industrial exhibitions. But some token of having taken part in an art-exhibition might be given to artists; and, perhaps, in the form of a medal. 8. Universal exhibitions should be regarded as standing in immediate connection, although held in different countries. There are but two countries which, for some time to come, are in a position to hold them, England and France. The political constitution of Germany will hardly allow it; besides, the larger German towns are in such situations that the transport of goods has many difficulties. As there are, then, but two countries fit for being the arena of such industrial festivals, it is not very difficult to arrange a plan upon which they might be conducted. It is particularly to be desired; *a*. That the classification of industrial articles be one and the same at all exhibitions. The classifications hitherto adopted, have not answered well, although they were made upon scientific principles; still they left many doubts where to place many articles, and, in consequence of this, many of them were put by the different countries in different classes of the catalogue, which caused some articles to be judged twice and even oftener by different jury-classes, others were not judged at all, and, at all events, labour was multiplied. To arrange a classification for future exhibitions, an international commission, consisting of only a few persons, should be entrusted with the task. Even if the new classification did not suit every wish, and should contain some arbitrary decisions, which, of course, there must be still it would be of great advantage to have such a one, as all, by their constant practice in arranging the goods, the catalogues, and the juries, would get accustomed to it. *b*. Such jurors as have proved their ability and willingness for the jury-work, should be enrolled again, as they are already acquainted with the firms, and most able to judge any visible progress. As there must always will be some jurors acting the first time in this capacity, they will get initiated into the business by the jurors who have already got experience. I acted this time with three jurors who had been my colleagues at the Paris Exhibition, 1855, and we felt great benefit by it. *c*. Particular care should be bestowed on the reports; they are the history of the development of industry, of civilisation, in our century, and should be regarded in that light. Not only by that which deserves praise, but also by that where faults have to be pointed out, we may learn, and it should not be left to mere chance, whether a report of a certain class is meagre or satisfactory. The jury reports themselves ought not to be more than a correct list of awards, with a statement of reasons; but to each jury-class should be attached a special reporter (who could be also juror), who should accompany the juries, and be in communication with the acting commissioners (home and foreign), to get the necessary general and special statistics, and write the report. One of these reporters might be entrusted to bring together all these reports, to put them into unison, and to act as general reporter. Such a mode should be adopted at all future exhibitions, and then the reports would be of invaluable and standing importance. In perusing my paper again I find that I have expressed my opinion but imperfectly, partly in using a foreign language, partly in consequence of my desire to be as brief as possible.

The Hon. and Rev. Samuel Best, Juror, Class XXIX. —1. I do not think they could be carried out without them in one form or another. 2. They almost of necessity imply some such stimulus. 3. No. 4. No. 5. I think the juries should consist of a defined and limited number, each of whom should sign the list of medals, &c., and thereby certify that he has examined each article to which a medal or other mark of honour has been awarded. It should also, I think, be laid down clearly that a medal is not to be given except for a distinct merit declared, that is, not for general merit, but for some particular production, and that this production should be new since the last exhibition. 6. I think it is, but the appeal should be made within a fixed time, and the jury of appeal be constituted by the selection of one from each jury, who would then be able to state the reasons which influenced the jury in its decisions.

Daniel Biddle, Juror, Class XXIV.—1. Yes. 2. The award of prizes causes emulation among the exhibitors, many of whom would make no display of goods at all, were it not for this incitement to do so; this consideration applies more particularly to foreigners, who set a very high value on the distinction of obtaining medals. 3. I am incapable of offering an opinion on this subject. 4. I cannot. 5. It appears to me most desirable that the chairman and deputy-chairman of the juries should be chosen on account of their practical knowledge of the articles in their respective classes, and not for their position in society. The jurors, when at their work, often need an authority to whom to appeal, therefore a thorough practical acquaintance with business seems to me the most desirable qualification in a chairman. 6. Decidedly not. 7. If opinions on the peculiar merits of each article exhibited were not given by competent jurors, the public would very easily be misled by the judgment of the press, or of other critics unable to judge properly of the various exhibits. The reward of "honourable mention" does not appear to be much valued by English exhibitors. I should suggest two classes of bronze medals, as far more desirable; the inferior class to be awarded wherever merit could be discovered, and the first class to any goods possessing particular excellence, or displaying novelty of

invention or execution. I am strengthened in this opinion as to the desirableness of two kinds of medals, by the fact that the great majority of articles exposed are worthy of commendation in some way, and this would be still more the case if greater care were taken to exclude all inferior or merely ordinary work. 8. (I.) Men who have acted as jurors or commissioners at former Exhibitions should have the preference over others, as their previous experience is often useful to others as well as themselves. (II.) Much time and annoyance would be saved if more power were given to the superintendent of each class, and to the chairman of each committee. Exhibitors have had just cause to complain of the hindrances often thrown in the way by unnecessary routine, and of the want of a courteous manner in some of the officials. (III.) Greater judgment should be exercised in classifying the goods for the jurors, as in some instances men have been called upon to give opinions respecting exhibits concerning which they have little or no practical knowledge. I may cite my own class (XXIV.), in which are included lace, embroidery, couch and upholstery trimmings, gold and silver ornaments for military purposes, tapestry, fringes, buttons, &c. A juror well qualified to adjudicate upon lace and embroidery will generally know little or nothing about the merits of guimps, buttons, &c. (IV.) I would suggest that dealers in goods seem to me fitter for the office of juror than manufacturers of the goods. The former have more opportunity of comparing one description of article with another, while the latter are apt to be partial to their own productions.

William Bird, Juror, Class XXXI.—1. Desirable, if a standard of merit could be found, but undesirable where such a standard is impossible. 2. From differences of opinion as to what merit consists of, the variety and degree of merit, the difficulty of finding to what individual the merit or degree of merit may belong, the apportioning between several claimants, and the suppression of the truth and suggestion of the false, frequently made by the exhibitor. 3. Yes, as there is no real standard in taste. 4. No, except to decrease their numbers. 5. To limit the number in each class to three, or five at the utmost, of which only one should be theoretical, the others technical, and avoiding manufacturers of articles of the class they are jurors in. 6. Yes, to a body selected from each jury, say one each, to be a court of appeal. 7. A supervision as to articles to be exhibited, and a medal to each exhibitor, not as a mark of merit, but merely as a *souvenir*. The public are the best jurors, and frequently reverse the decisions of juries. 8. The total repeal of our patent laws as the greatest boon both to inventors and manufacturers, and science and art generally.

Richard Birkin, Deputy-chairman and Reporter, Class XXIV.—1. Yes. 2. Universal incentives to exertion. 3. Sees no reason why the Fine Arts should be excluded. 4. No. 5. None, except securing a larger number of practical men as jurors. 6. No appeal unless on ground of insufficient information having been furnished. 8. Better to have gold medals in addition, for special cases of merit.

Henry Black and Son, Exhibitors, Class VI.—We think it not advisable to attempt to distinguish merit at International Exhibitions by medal or otherwise. 2 *a*. Because, in most instances, no amount of care and good faith on the part of persons appointed to decide can prevent their being, to some extent, biased by preconceived opinions. *b*. Because it is very difficult, if not impossible, to distinguish between merits of different kinds; and justice can only be done by distributing prizes broadcast, which process would of itself render them valueless, *c*. Because the same goods may often be finished in totally different styles, one rough, another ornamental, and while one jury may consider low price a point to be rewarded, another may think high finish most desirable, though neither low price nor high finish are correct tests of cheapness. *d*. Because, in many manufactures, continued use is the only reliable test of superiority between articles of nearly equal merit, and this cannot be applied by a jury. *e*. Because the jurors can have no reliable information that the goods exhibited are of the description usually supplied by the exhibitor, or even that they are made by the class of persons usually in his employ, or that they are made under his own superintendence. *f*. Because the prize once awarded, places in the hands of an unscrupulous exhibitor a sort of guarantee, under cover of which he can supply an inferior article; if to this it be answered that the public must themselves take care that they are properly served, we reply that this can be quite as readily or more readily done without the intervention of prizes at all. 6. Appeals would be open to the same objections as the original awards, and the bias would naturally be to support the original decision. 7. All meritorious productions have equal opportunities of becoming known, unless special prominence be given to some by the awards of so-called judges. A demand having once created a supply, the supply must necessarily flow into the proper channel, and the present methods of communication are such that no really meritorious production need long be confined within circumscribed limits. 8. Our own experience of prizes leads us to place very little reliance on them.

Sir John P. Boileau, Bart..—1. Yes. 2. They stimulate exertion, and frequently aid its reward. 3. No. 4. No; if jurors are selected as they ought to be. 5. Should be partly men cognizant practically with the objects exhibited, and partly independent men of intelligence, and attentive to science, art, and manufacture. 6. No. 7. None equally good. 8. None.

Beriah Botfield, M.P., F.R.S., Juror, Class XXXVI. —1. Yes. 2. They encourage exhibitors. 3. No. 4. No. 5. No. 6. No. 7. Answered in number 6. 8. None.

Bowron, Bailey and Co., Exhibitors.—1. Yes, but not by medals. 2. Public judgment requires to be directed. 3. Yes; in matters of fact the public can judge for themselves. 4. Cannot. 5. A single medal does not distinguish the degrees of merit, and hence may mislead. Certificates of merit of different degrees should be given. 6. Yes; for errors must occur which ought to be set right. The judgment appealed against should be sent back to the jury for reconsideration, and if then not satisfactory, the point should be left to arbitration.

Richard John Boyall, Carriage manufacturer, Exhibitor.—1. Yes, under certain circumstances. 2. Cause emulation. 3. No. Excellence should always have its reward. 4. Properly constituted juries are best. 6. Yes, if awards are given as in 1862.

Sir David Brewster, K.H., F.R.S., Juror, Class XIV.— 1. Certainly. Instead of medals, special certificates of merit, or diplomas, should be given, and signed by one or more jurors. 2. No reasons can be required for publicly rewarding merit of any kind. 3. Certainly. 4, 5. A jury of persons who speak different languages is a great evil. The diplomas of merit should be signed by persons who have specially examined the inventions or processes, or articles to be rewarded. Each jury should be divided into groups, and special duties assigned to each group. 6. There should be an appeal only when there is a considerable difference of opinion among the jurors.

Charles E. Bright, Commissioner for the Colony of Victoria.—1. Yes; by a single medal or honourable mention. 2. If awards were not given, exhibitors would not receive support from manufacturers or inventors. An article receiving a medal for merit, or honourable mention, is thereby advertised, and becomes at once known to the public. 3. Awards for merit might be given for works of fine art and designs, but not for competition. 4. No. 5. Each jury should be made distinctly aware of what class of articles it has to adjudicate upon, whether manufactured or otherwise. 6. Yes; in cases only where a

particular article has been passed over and not noticed by the jury of the class to which it belongs. 7. Awards are desirable. 8. No.

John Brown, of the firm of John Brown and Co., Atlas Works, Sheffield, Mayor of Sheffield, and Juror, President of Sect. A, Class XXXII.—1. Yes; but awards should only be given to actual producers, and in no case to mere exhibitors. 2. Because the recognition of merit in any production, when the jury are men who possess public confidence, is in itself a recompense to the producer, and is also a sure means of obtaining for him the pecuniary reward which he is entitled to receive. 3. Certainly. 4. No; it is above all things necessary that the jurors be free from personal interest or bias. 5. No. 6. Certainly not. 7. Any means by which meritorious productions may be brought to the notice of the public is, *de facto*, an award of merit. 8. No.

James Buckman, Professor Royal Agricultural College, Cirencester; Juror, Class III.—1. Rewards of two kinds: one a medal, the other a parchment certificate; the first for inventions and original discoveries, the second for exhibitors. 3. Would not exclude the Fine Arts. 5. Classes should be much sub-divided for jury work. 6. Appeal to some paid responsible officer to correct mistakes. 7. Can suggest no better means. 8. As subdivision of classes would seem to require more jurymen, suggests that two competent men are sufficient for a jury.

Gen. Sir John F. Burgoyne, G.C.B., Chairman of Jury, Class XI.—1. The result of my experience, as a juror, on the classes for Military Art and Implements, in 1851, 1855, and 1862, leads me to an impression that, attempting to make awards for merit, by juries, at such exhibitions, is unsatisfactory; for the following reasons:—1. Where so much excellence is displayed on every side, it becomes in many cases almost a matter of caprice, or of the importunate admiration of one or two jurors in favour of an object, to obtain the selection for the honour of a medal or of honourable mention. 2. In a very large proportion of cases, the articles are exhibited for a display to the world of their commercial value; favourable awards are then made use of as important testimonials of their superior character over those of rivals who may, or may not have exhibited, and give a weight to them beyond what many may be reasonably entitled to. This indeed may be, and is carried so far, that having received a medal for some distinct article or process, is held out as a testimony in favour of a whole establishment, where many articles may not have any claim to peculiar superiority. 3. However conversant the jurors may be with the subjects generally submitted to their decision, in many cases they have neither the time nor means for forming a perfectly correct judgment on them. Many articles that are new, however promising and attractive, may require the test of trial and experience; and if for common use, and not merely as specimens of what it is possible to obtain, the more or less facility and cost of production are essential elements of merit, and cannot be always within the cognisance of the jury, except on the word of the exhibitor, who may naturally be over confident. 4. A principle of courtesy to nationalities at these general exhibitions, that are open to the whole world, must have a great influence in the decisions, and operate against perfect impartiality.

A. Campbell, M.D., Juror, Class III., Section B.—1. Yes. 2. Medals take a position analogous to orders of merit. 3. No. 4. No, notwithstanding their imperfections. No one should be a juror who cannot devote his whole time to the work. 5. Paid jurors and officers to prepare the work. 6. No; except in very special cases.

Charles James Case, Exhibitor, Class VI.—1. Yes. 2. Necessary for the sake of emulation. 3. No. 4. No. 5. Jurors should be practical men. 6. Yes. 7. No. 8. Appeal necessary; refers to his own case.

J. P. Charley, Juror, Class XIX.—1. I prefer no awards, but only a general report by some qualified, efficient authority. 2. The great difficulty in discriminating—the discontent and bad feeling always created among competitors, the encouragement to "puffing," for which the medals are often desired, and the great expense to quiet respectable firms who do not advertise, and who must compete or lose *prestige*. Goods sent to exhibitions are mostly special, and not fair specimens of general make. 3. Certainly. 4. No. 5. No. 6. Certainly not; it would be fatal to order, and cause increased bad feeling. 7. Public opinion is, in my mind, sufficient, and would, I think, be preferred by most exhibitors. 8. These exhibitions ought not to be too frequent; once in ten years is often enough.

W. H. Child, Exhibitor.—1. Yes. 2. Gives a stimulus to improvement. 3. No. 4. No. 5. Juries should be selected by the manufacturers of each class, five in number, and no exhibitors on them; if of sufficient importance, seven—3 English, 3 foreign, and a Commissioner for Chairman. 6. Yes; if class or majority dissatisfied.

(To be continued.)

BRITISH ASSOCIATION, CAMBRIDGE, 1862.

On Economising Fuel in Iron-plated Ships of War

The following is an abstract of a paper read in section G.—Edward Allen, Assoc., I.C.E, M.I.M.E., Assoc., I.N.A.

There are several important reasons why every effort should be made to economise the consumption of fuel in the ships of our new iron-plated fleet, viz:—Additional weights, increase of speed and distance to be steamed, increased despatch in moving from station to station, and of time during which steam power will probably be used even under ordinary circumstances, and increase in the cost of coals, owing to the continual increasing size, power, and number of steam ships in the Royal Navy.

To these reasons for economising fuel we may add: The universal deficiency of boiler power in ships of the Royal Navy, necessitating a relative increase of space being allowed for this portion of the machinery; as also the fact now generally admitted that much smaller vessels than those first constructed will be necessary in order to constitute an efficient fleet; these small vessels being of course as thickly plated as the very largest, if not more so, on account of their speed being considerably less.

From the particulars given in the following table, it may be stated, that in most of our iron-plated ships the weights of the three items, viz., the armour plating, the machinery, and the fuel, are very nearly equal, and that together they constitute about one-third of the total displacement, *i.e.*, in vessels plated amidships only. Marine engines of good construction, when working full power, exert a force, when measured by indicator, considerably above their nominal power; and it is a rule with the Admiralty that all engines supplied to them shall work up to at least four times this nominal power. Now the average consumption of fuel in marine engines of the ordinary but best construction being about 4½lb. per indicated horse power per hour, it follows that a nominal horse power requires about 4 cwt. of best coals in the day of twenty-four hours, so that a 1,000-horse power engine would consume something like 200 tons of coal per day when working full power. Comparing this quantity with that for which stowage is given in the iron-plated ships of the Royal Navy, it will be seen that the best of them carry no more coal than would serve them for about four days' full steaming.

We are, nevertheless, told that in all or nearly all cases, seven days' supply is provided, but this can only be on the supposition that the engines are not intended to work full power the whole of the time; indeed, with the ordinary boilers used on board war steamers, this is not possible, for it is well known that full steam cannot be kept for more than twenty-four hours together.

Table of all Iron-cased Ships and Floating Batteries building or afloat, with assumed weights of their armour plating, and quantity of coals carried, the latter deduced from difference of draught with and without coals.

	Afloat, or Building, &c.	Iron or wood.	Wholly or partially cased.	Length. ft. in.	Beam. ft. in.	Mean draught ready for service.	Diff. without coals.	Tonnage.	Nominal H.P.	Assumed weight of coals carried.	Assumed weight of armour plates.
Agincourt	Building	Iron	Partially	400 0	59 3½	25 8	1 7	6,621	1,350	1,000	850
Minotaur	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
Northumberland	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
Achilles............	,,	,,	,,	380 0	58 3½	26 3½	1 10½	6,079	1,250	,,	800
Black Prince......	Afloat	,,	,,	380 2	58 4	25 11	1 8	6,109	,,	950	,,
Warrior...........	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
Hector	Building	,,	,,	280 0	56 3	24 8	1 0½	4,063	800	450	450
Valiant	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
Defence	Afloat	,,	,,	,,	54 2	24 11	1 4	3,720	600	550	,,
Resistance	,,	,,	,,	,,	54 1	,,	,,	3,710	,,	,,	,,
Caledonia	Building	Wood	Wholly	273 0	58 5	25 10½	1 6½	4,045	1,000	650	950
Ocean	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
Prince Consort...	Afloat	,,	,,	,,	,,	25 11½	1 7½	,,	,,	,,	,,
Royal Alfred ...	Building	,,	,,	,,	,,	25 10½	1 6½	,,	800	,,	,,
Royal Oak.........	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
Royal Sovereign	Converting	,,	,,	240 7	62 0½	22 11	1 5	3,963	,,	550	750
Prince Albert ...	Building	Iron	,,	240 0	48 0	20 0	1 9	2,529	500	230	,,
Favourite	,,	Wood	,,	225 0	46 9	20 5	1 4½	2,186	400	400	...
Enterprise.........	,,	,,	Partially	180 0	36 0	14 7½	1 7½	990	160	100	...
Erebus	Afloat	Iron	Wholly	186 8½	48 6	8 9	1 3¼	1,954	200	80	...
Terror	,, Floating batteries.	,,	,,	186 3	48 8	,,	,,	1,971	,,	,,	...
Thunderbolt......	,,	,,	,,	186 11	48 5¾	,,	,,	1,973	,,	,,	...
Ætna...............	,,	Wood	,,	186 0	43 11	8 2	1 3	1,588	,,	300	...
Glatton	,,	,,	,,	172 8	45 2½	8 9	1 3	1,535	150	60	...
Thunder	,,	,,	,,	172 6	43 11	8 11	1 4	1,469	,,	80	...
Trusty	,,	,,	,,	173 6¼	45 1¾	8 8	1 3	1,539	,,	60	...

The very great increase of power necessary to propel any given vessel at an increased speed renders it a matter of some difficulty to obtain a rate of speed in the iron-cased ships such as that believed to be desirable. If a certain power be necessary to drive any given vessel of good form at ten knots per hour, then to increase the speed of the same vessel to twelve knots, will require nearly double that power; to increase it to fourteen knots the power must be nearly three times as great, and to increase it to sixteen knots the power will require to be more than qua drupled. The estimated speeds of our new ships of war' even in smooth water, are considerably less than those thought necessary *at sea* by naval men and many others, and the difference is as much as one and a half to two knots per hour.

Six of the largest vessels are estimated to attain about fourteen knots per hour; five of them about twelve knots; two of them about eleven and three-quarter knots per hour; four of them about eleven knots; one about ten and three-quarter knots, and one only nine and a half knots; and in the vessels tried even these speeds have not been attained; whereas fifteen knots per hour has been very generally assigned as the speed below which our new iron-plated ships of war should not be propelled when at sea. In favour of such speed we have the opinions of Mr. Scott Russell, Mr. Samuda, Captain Halsted, Commander Oldmixon, Admiral Moorsom, and many others.

With regard to the distance which such vessels should be able to go without recoaling, we have the most distinctly expressed opinion of Mr. Scott Russell and Captain Halsted, as well as those who have commented upon their views, that 5,000 miles should be the minimum, whereas none of our ships could, with their ordinary supply of coal, go one-third of that distance.

With respect to the increased cost of coaling the ships of the Royal Navy, it will be found that the charge on this head is now over £300,000 per annum, and in war time more than double the ordinary amount is expended. What will it be, even in times of peace, when a fleet of iron-cased ships of the *Warrior* class shall have been formed?

The present Surveyor of the Navy says:—"As far as my experience goes, no ship of any class or with any makers' engines has sufficient boiler space; there is not one of the multitudes I have tried that has steam enough to keep the throttle valve open for two hours. The steam drops directly the vessel goes over nine knots, and this not in one or two, but in all without exception. * * * * Nothing is so wasteful of fuel as too small a boiler: intense firing and incomplete combustion of the fuel is the inevitable result of trying to keep up steam in such a case. * * * Not a step is made in the right direction of obtaining speed and economy until more attention is paid to the proper proportion between the quantity of steam used in the cylinders at each stroke, and the quantity remaining in the boiler."

He says that 600-horse boilers should be used where 450-horse power boilers are now employed, and the ships would go faster, not perhaps rush past the measured mile quicker, but in a chase of four or five hours.

The Committee on Marine Engines, reporting upon this and other evidence, observe:—"It appears that in general the boilers supplied to our men of war are deficient in generating steam, and that full speed in consequence can only be maintained for a short time. Now the remedy for that defect must necessarily involve the whole question of the amount of space that can be allotted to the boilers."

It has been long known that many vessels in the merchant service have been working now for some years upon just one-half of the fuel consumed in ships of the Royal Navy. In proof of this, Mr. Allen quotes the opinions of Mr. Charles Atherton, late Chief Engineer of Woolwich Dockyard, and of Mr. Andrew Murray, Surveyor to the Board of Trade.

The principles of construction on which this important saving is made may shortly be stated as follows:—

1st. Proportionate increase of boiler power.
2nd. Expansion of the steam to say 5lb. pressure.
3rd. Jacketing the cylinders.
4th. Superheating the steam.
5th. Condensing by surface instead of by jet; and
6th. Heating the feed water.

And all this may be done without increasing the pressure of steam above 20lb. or 25lb., although the higher the pressure of steam, the greater the economy of fuel.

It is difficult to assign the exact proportionate value of each of these six modes of economising fuel, as they have seldom, if ever, been so far separated as to admit of correct deductions; but, taken altogether, there is now no doubt that *fifty per cent.* may be saved in the ordinary consumption of fuel. This saving has been practically effected in several vessels where the principles above stated have been carried out.

In the early part of 1855 the author read two papers at Birmingham on "The Commercial Economy of Expanding Steam in Marine Engines," and described several new forms of engines suited to this purpose, and, in 1858 sent detailed drawings of engines to the Admiralty, the designs being made with a view to effect a large saving in fuel. One of these was that of concentric cylinders, with three piston rods and cross heads, the two outer rods being carried to a guide block, from which the connecting rod was returned to the crank; this arrangement being precisely that adopted in the Swedish gunboats, and for which a medal has been awarded to the maker in the Exhibition.

In the early part of the present year he again addressed the Admiralty, calling their attention to this subject, and requesting the favour of an examination of the engines constructed on his patent of 1855, by Messrs. J. and G. Rennie, and which may be described as double expansive end-to-end cylinders, the small cylinder being placed at the back of the large one, motion being communicated to the crank by means of double piston rods. Even this arrangement has, it appears, been recently tried on one of the Swedish vessels of war, the results of working being, it is said, very satisfactory.

In these several applications to the Government, the author's object was to show how the expansive principle could, in his opinion, be best carried out in ships of war, fulfilling the necessary conditions of such vessels, *i.e.*, of keeping the weights down as much as possible and the machinery below the water level.

He showed, in his papers, that the suggested alterations in marine engines could be made without either adding to the gross weights carried or to the space occupied in the ships, and that a very considerable saving of coal would be the result; increased capacity of cylinder to allow of full expansion of the steam, being, of course, under every possible arrangement absolutely necessary.

One of the forms of marine engines suggested by the author in 1855 has lately been adopted in the case of the *Poonah's* engines, now building by Messrs. Humphreys and Tennant, the small and large cylinders being placed end to end, as above described, with reference to the engines made by Messrs. Rennie, but motion being given to the crank shaft by means of a trunk working in the large cylinder.

For these several forms of double expansive engines the author claims the following advantages:—

1st. Capability of fully expanding the steam without the use of expansion gear.

2ndly. Great uniformity of motion by reason of the steam from the boiler acting upon a comparatively small area, not pressing upon the large pistons until partially expanded.

3rdly. Saving of considerable weight on account of the strength of the connecting rods, piston rods, &c., being only necessarily proportioned to the pressure of the initial steam on the small piston and the expanded steam on the large area, instead of the initial steam on the latter; or, rather, upon a considerable extension of it, as in the case of a single acting cylinder designed for great expansion, its AREA must be greatly increased, the stroke not being capable of being lengthened.

4thly. Considerable saving of steam owing to the loss in the clearances in the small cylinder being made less than that in a very large cylinder, the loss in the latter case absorbing a large percentage of the steam.

5thly. The cylinders being in line with each other, no increase in the number of piston rods, connecting rods, or guides is necessary.

6thly. That, practically, all the advantages of a long-stroked engine are obtained without increasing the stroke, which cannot be done owing to the speed of revolution of direct acting screw engines being necessarily high.

And 7thly. That by fully expanding the steam, a far less quantity suffices for the production of a given power, thus allowing of the boilers being reduced a third or a fourth, still leaving a large proportionate increase in boiler power compared with the steam required.

It will be readily admitted, on all hands, that very considerable difficulties would be found in making ordinary marine engines fully expand their steam, an increase in the capacity of the cylinder of from two to three times being essential.

At present the shape of the cylinders of marine engines approaches to that of those of rivetting machines, their diameter being frequently 2½ times the stroke; whereas in pumping engines, in which economy is studied, the cylinders assume an entirely different form, their lengths being three times their diameter. Indeed, all engineers admit that, in very short cylinders, *i.e.*, single acting ones, economy is out of the question. It is, therefore, greatly to be regretted that, in our iron-plated ships, even in those of the largest class, the same form of engines has been adopted as was employed fourteen years ago, notwithstanding Mr. Atherton, the late engineer at Woolwich Dockyard, recommended some years ago that "double expansive engines ought to be tried," especially as superheating of the steam had been carried out.

In the twenty-six iron-cased ship constructed and constructing, a force of no less than 18,310 nominal horses power is to be employed, and when working full power, every day will witness an unnecessary consumption of upwards of 1,700 tons of coals, which, on foreign stations, would certainly amount to more than £5,000.

This loss is, however, not what is to be most regretted; but rather the fact that our iron-cased fleet, the largest vessels of which are to cost upwards of £350,000 each, and are provisioned for four months, should only carry coals enough for from four to five days' steaming.

If it be maintained that the quantity of coals carried is sufficient—which, I think, the Admiralty authorities would hardly acknowledge—even then is it not better to increase the armour plating, or the speed of the vessels, by reducing their draught or increasing the power of the engines, rather than to carry an unnecessary quantity of expensive fuel?

It is now certain that the speed of the *Warrior* and *Black Prince* is much below what was anticipated. And even if a speed of fourteen knots were obtained, under the most favourable circumstances of clean bottom, clean tubes, and fair weather, this would be reduced to about twelve knots at sea, running days together; and this is no less than three knots below the speed that has been considered necessary. Again, if the present quantity of fuel carried be enough, the engine power could be increased some 40 per cent. without increasing the draught of water, and still allow of the same number of days' fuel. This increase of power would increase the speed about one knot and a half

per hour, which cannot be regarded as a matter of slight importance.

With these facts before us, the question arises, "Are we justified in continuing to employ engines of the ordinary kind in our iron-plated ships of war?"

Our present navy consists of vessels in which there is a nominal power of upwards of 142,000-horses, distributed in about the following proportions:—

	Horse-power.
Ships in commission	60,000
Do. in ordinary	51,000
Do. used as transports, &c.	13,000
Do. (new iron-plated) and batteries	18,000
Total	142,000

The ultimate extent of our iron-cased fleet, of course, is not as yet known, but taking the very moderate estimate made by Mr. Scott Russell, we have yet engines to provide to the extent of, at least, 60,000-horse power, making a gross power of 200,000-horses.

Assuming that one-half of these vessels are in commission in time of peace, the daily consumption of coal when working full steam would be over 15,000 tons at the present rate per indicated horse power.

Now ships in commission may be fairly assumed to be one-third of their time under steam, say two days per week, or 100 days in the year. They will probably be half this time under easy steaming, and the remainder three-quarters and full steaming, and will consume from 2½ to 3 cwt. of coal per day, or 14 tons per annum per nominal horse power, or for the whole of the ships in commission about 1,400,000 tons per annum. This is, then, what we may look forward to in the navy returns in future years of peace, *i.e.*, if the present consumption of fuel be maintained. It is just half this quantity which experience has now fully proved may be saved by a modification in the mode of constructing and working marine engines, and this saving of fuel will give us one or other of the following advantages in addition to the money saving, viz:—

Increase of armour plating 50 per cent.; or,

Increase of speed to the extent of one knot and a half; or,

Increase of number of days' fuel to double what it now is; or,

Diminished draught to the extent of 8-in. to 12-in., according to the vessel.

Thus enabling us to have armour-plated vessels of comparatively very small tonnage.

To all this we must not forget to add the loss of time, expense, and inconvenience, of frequent coaling when only five or six days' supply are carried; and, again, the cost and labour of trimming the coals and feeding the furnaces with double the quantity which would be needed with good double expansive engines.

It is hoped that these considerations will induce the Lords of the Admiralty to turn their attention to the advantages of working steam expansively in the vessels of the Royal Navy, not simply as it has hitherto been done, and when the power is proportionately diminished and no saving effected, owing to the machinery not being adapted for expansive working, but constantly and regularly in ordinary working and under proper conditions, when its advantages would be at once experienced.

In conclusion, it is only fair to mention that soon after the appearance of the report of the Committee on marine engines, recommending that the number of contractors for government engines should be increased, and that the best engines should be adopted in ships of the Royal Navy, by whomsoever proposed to be supplied, orders were issued for three pairs of engines, designed to work with less fuel than usual. Messrs. John Penn and Son supplied a pair of large trunk engines, with surface condensers; Messrs. Maudslay a three-cylindered arrangement, also with surface condensers, designed by Mr. Sells; and Messrs. Randolph and Elder a six-cylindered arrangement, also with surface condensers.

Neither of these vessels has as yet been fully tried, the results, however, being anxiously looked for by engineers.

Considering the nature of these three plans, which, with the exception of the trunk engines, involve considerable complexity, the trunk and three cylinder arrangements being, moreover, single expansive engines, it is very doubtful if the results can be altogether satisfactory; and certainly cannot be so far so as to warrant experiments stopping at the point at which they have now arrived. Trials should at least be given of such other arrangements as appear likely to give favourable results.

The double-expansion end-to-end cylinder engines proposed by the author in 1855, for ships of war, having now been very ably worked out by Messrs. J. and G. Rennie, and, it is understood, been favourably reported upon by the inspecting engineer of the Admiralty, who was instructed to examine them, it is hoped an opportunity will shortly be afforded of testing their suitability for her Majesty's ships; the success of the principle of double expansion being already fully established, and Messrs. Rennie being prepared to guarantee to the Government that the consumption of fuel shall not exceed 2 to 2½lb. per indicated horse power per hour, or half the ordinary consumption.

GALLERY OF INVENTIONS AND SCIENCE, FREE PUBLIC LIBRARY AND MUSEUM, LIVERPOOL.

This gallery is under the management of a committee appointed by the following societies:—The Architectural and Archæological Society, the Chemists' Association, the Historic Society of Lancashire and Cheshire, the Literary and Scientific Society of Liverpool, and the Liverpool Polytechnic Society.

The officers are:—President, Colonel Wm. Brown (founder); Chairman, Alderman Bennett; Treasurer, G. F. Chantrell; Honorary Secretary, John Abraham. It is intended to be a permanent institution for the transitory exhibition of useful inventions and manufactures, and to assist the public in keeping pace with the progressive development of the arts and sciences.

This it is proposed to effect by providing space gratuitously for the exhibition of articles which illustrate the practical applications of science or of mechanical skill, with other objects of interest, but to continue this privilege only so long as the objects exhibited maintain their claim to public attention by excellence or novelty. The committee have, therefore, reserved to themselves the right to withdraw any object when its public interest fades, and thus make room for others which in their turn may serve a term of usefulness; but, as each application for space contains also an agreement for time, which is equally binding on both parties, until its expiration the committee will not exercise their power of removal.

The benefit of the public is secured by giving absolutely free admission to the gallery, and the advantage to exhibitors is found in the publicity thus obtained. This, however, is still further increased by the permission to affix a description to each object, and attach the price when saleable; and other information may be left with the superintendent, who will be the medium of communication between the public and the exhibitors.

It will thus be seen that the objects of the Institution are twofold—the instruction of all who seek knowledge, and the benefit of all who have applied that knowledge usefully.

ORIGIN OF PETROLEUM.

Dr. J. B. Edwards, in the *Pharmaceutical Journal*, says, the flow of oil from mineral springs is by no means new either to science or commerce. Herodotus has recorded that the island of Zante furnished large

quantities, while Pliny and Dioscorides describe the oil obtained from Agrigentum, a small town of Sicily. The Persian springs at Bakoum have yielded to the value of 600,000 dols. annually; and the earth oil from Rangoon, in Burmah, has been exported to the extent of 400,000 hogsheads yearly. The streets of Genoa and Amiens were formerly lit by a petroleum obtained from Parma. In 1847, a spring was discovered in Yorkshire, which was successfully worked by Mr. James Young, of Glasgow, until exhausted, when he turned his attention to the distillation of coal, and discovered paraffin oil. The marvellous oil springs of the New World, however, far surpass in extent and interest all previous discoveries, and the quantities already yielded, without apparently diminishing the supply, show that this will be a most important article of commerce for some years to come.

Home Correspondence.

BRITISH MINERALS.

Sir,—The following list of British minerals, and of colonies in which minerals are found, will be interesting as a supplement to Mr. Hunt's valuable paper, read last Wednesday evening.

I am, &c., JAMES TENNANT.

List of Minerals given in "Manual of the Mineralogy of Great Britain and Ireland," by Robert Phillips Greg, F.G.S., and William G. Lettsom. London (1858), Van Voorst.

Class I.—NON-METALLIC MINERALS.

Order.—I.—Carbon.

1. Graphite.
2. Coal.
   a. bituminous coal.
   b. non-bituminous coal.
   c. brown coal, &c.

Order II.—Water.

3. Ice.

Order III.—Resin.

4. Amber.
5. Copaline.
6. Middletonite.
7. Retenite.
8. Schleretinite.
9. Burytite.
10. Bitumen.
    a. Naphtha.
    b. Petroleum.
    c. Elaterite.
    d. Asphaltum.
11. Torbanite.
12. Ozocerite.
13. Hatchetine.

Order IV.—Sulphur.

14. Sulphur.

Order V.—Fluorine.

15. Fluor-spar.
16. Fluellite.

Order VI.—Chlorine.

17. Rock-salt.
18. Sal-ammoniac.

Order VII.—Carbonates.

19. Arragonite.
20. Calcite, &c.
21. Strontianite, &c.
22. Witherite.
23. Barytocalcite.
24. Alstonite.
25. Dolomite.
26. Breunerite.
27. Ankerite.
28. Hydrocalcite.
29. Pennite.
30. Hydromagnesite.

Order VIII.—Oxides.

31. Brucite.

Order IX.—Sulphates.

32. Anhydrite.
33. Barytes.
34. Celestine.
35. Mascagnine.
36. Epsomite.
37. Alum.
38. Gypsum.
39. Websterite.

Order X.—Phosphates.

40. Apatite.
41. Wavellite.
42. Childrenite.

Order XI.—Silex and Silicates.

43. Quartz, &c.
44. Opal, &c.
45. Garnet, &c.
46. Idocrase.
47. Epidote, &c.
48. Zoizite?
49. Felspar.
50. Labradorite, &c.
51. Albite.
52. Saussurite?
53. Muscovite.
54. Biotite.
55. Staurolite.
56. Andalusite, &c.
57. Kyanite.
58. Beryl.
59. Spodumene.
60. Killinite.
61. Obsidian, &c.
62. Isopyre
63. Iolite (Cordierite).
64. Zircon.
65. Olivine.
66. Gadolinite.
67. Allanite.
68. Wollastonite.
69. Augite, &c.
70. Bronzite.
71. Hypersthene.
72. Diallage.
73. Babingtonite.
74. Hornblende.
75. Natrolite.
76. Scolezite.
77. Mesolite, &c.
78. Faröelite (Mesole).
79. Thomsonite.
80. Stilbite.
81. Epistilbite.
82. Heulandite.
83. Chabasite, &c.
84. Gmelinite.
85. Levyne.
86. Laumonite.
87. Phillipsite.
88. Brewsterite.
89. Analcime.
90. Harmotome.
91. Edingtonite.
92. Weissigite?
93. Prehnite.
94. Allophane.
95. Chlorite.
96. Aphrosiderite.
97. Kammererite.
98. Margarodite.
    a. Nacrite.
    b. Gilbertite.
    c. Talcite.
99. Talc-steatite.
100. Lithomarge.
101. Saponite.
102. Kaolin.
103. Pinite.
104. Apophyllite.
105. Pectolite.
106. Gyrolite.
107. Serpentine, &c.
108. Topaz.
109. Chondrodite.
110. Lepidolite.
111. Tourmaline.
112. Datholite.
113. Axinite.

Order XII.—Alumina and Aluminates.

114. Corundum.
115. Spinel.

Class II.—METALLIC MINERALS.

Order I.—Gold.

116. Gold.

Order II.—Silver.

117. Silver.
118. Argentite.
119. Pyrargyrite.
120. Horn silver (kerate).

Order III.—Platinum.

121. Platinum.

Order IV.—Iron.

122. Metallic Iron (meteoric).
    Appendix. Meteoric stones.
123. Hematite (specular iron).
124. Magnetite.

125. Gōthite.
136. Limonite.
127. Siderite.
128. Ilmenite.
129. Iserine.
130. Cronstedtite.
131. Vivianite.
132. Scorodite.
133. Pharmacosiderite.
134. Beudantite.
135. Melanterite.
136. Iron alum.
137. Fayalite.
138 Chlorophæite.
139. Green earth.
  a. Glauconite.
  b Kirwanite.
140. Pitticite.
141. Pyrites.
142. Marcasite, &c.
143. Pyrrhotine.
144. Mispickel.

Order V.—Manganese.

145. Pyrolusite, &c. (Varvicite).
146. Manganite.
147. Psilomelane.
148. Wad.
149. Diallogite.
150. Rhodonite.

Order VI.—Nickel.

151. Annabergite.
152. Emerald nickel.
153. Millerite.
154. Eisen-nickelkies.
155. Nickeline (kupfernickel).

Order VII.—Cobalt.

156. Asbolane.
157. Erythrine.
158. Smaltine.
159. Cobaltine.

Order VIII.—Copper.

160. Copper.
161. Cuprite.
162. Melaconite.
163. Pitchy copper.
164. Malachite.
165. Chessylite.
166. Liroconite.
167. Tamarite.
168. Clinoclase.
169. Olivenite.
170. Cornwallite.
171. Erinite.
172. Libethenite.
173. Lunnite.
174. Blue vitriol.
175. Brochantite.
176. Chrysocolla.
177. Condurrite (Domeykite)
178. Copper glance.
179. Kupferindig (Covelline).
180. Tennantite.
181. Tetrahedrite.
182. Chalcopyrite.
183. Erubescite.
184. Bournonite.
185. Connellite.
186. Molybdenine.
187. Molybdenite.

Order X.—Tungsten.

188. Tungstic ochre (Wolframine.)
189. Scheelite.
190. Wolfram.

Order XI.—Tin.

191. Cassiterite.
192. Stannine.

Order XII.—Titanium.

193. Rutile.
194. Anatase.
195. Brookite.
196. Sphene.

Order XIII.—Arsenic.

197. Arsenic.
198. Arsenite.

Order XIV.—Antimony.

199. Kermes (Red antimony).
200. Cervanite.
201. Antimony ochre (Stiblite).
202. Bleinierite.
203. Antimonite.
204. Berthierite.

Order XV.—Bismuth.

205. Bismuth.
206. Bismuth ochre.
207. Bismuthine.
208. Daphyllite (Tetradymite).

Order XVI.—Uranium.

209. Uran-ochre (Zippeite).
210. Pitchblende.
211. Chalcolite (Uranite).
212. Autunnite.

Order XVII.—Lead.

213. Lead ?.
214. Minium.
215. Plattnerite ?.
216. Cerussite.
217. Anglesite.
218. Linarite.
219. Leadhillite.
220. Susannite.
221. Lanarkite.
222. Caledonite.
223. Pyromorphite, &c.
224. Mimetite.
225. Vanadinite.
226. Stolzite.
227. Wulfenite.
228. Galena.
229. Jamesonite.
230. Kilbrickenite (Geocronite).
231. Mendipite.
232. Matlockite.
233. Cromfordite.

Order XVIII.—Zinc.

234. Calamine.
235. Aurichalcite.
236 Smithsonite.
237. Goslarite.
238. Blende.

Order XIX.—Cadmium.

239. Greenockite.

Order XX.—Chromium.

240. Chrome oxide.
241. Chromite.

SUPPLEMENT.

1. Apjohnite.
2. Agalmatholite.
3. Bole.
  a. Erinite.
  b. Rhodalite.
  c. Fuller's-earth.
  d. Rock-soap.
4. Calcareo-sulphate of barytes.
5. Calcareo-sulphate of strontian.
6. Doranite.
7. Leedsite.
8. Mineral charcoal.
9. Nitro-calcite.
10. Pipe-clay.
11. Potter's clay.
12. Pigotite.
13. Plinthite.
14. Rotten-stone.
15. Scarbroite.
16. Stannite.
17. Supersulphuret of lead (Johnstonite).
18. Tuesite.
19. Verrucite.

THE BRITISH COLONIAL POSSESSIONS,

IN WHICH TWO HUNDRED ADDITIONAL MINERALS ARE FOUND.

Australia, South
Australia, Western
Bahamas
Barbados
Bermuda
British Columbia
Canada
Cape of Good Hope
Ceylon
Channel Islands
Dominica
Honduras, British
India
Jamaica
Malta
Mauritius
Natal
New Brunswick
Newfoundland
New South Wales
New Zealand
Nova Scotia
Prince Edward's Island
Queensland
St. Helena
St. Vincent's
Tasmania
Trinidad
Vancouver
Victoria

MR. HUNT'S PAPER ON MINES.

Sir,—But for a nervous dislike to public speaking generally, I should have risen on Wednesday evening to express the pleasure I had felt in listening to Mr. Hunt's valuable and interesting paper on the "Mines and Minerals of the United Kingdom," and also to take part in the discussion that followed, if only to remove one or two impressions from the minds of the speakers, which I am sure it was never Mr. Hunt's intention to convey.

Will you permit me, therefore, to offer a few remarks through the *Journal* of the Society.

The objects of Mr. Hunt's paper, or some of them, were to show the vast mineral resources of this country; to impress upon the mining community the necessity for improved education; and that "mining, commenced with proper judgment, legitimately carried onward, guided by the advice of experienced miners, and directed by honest intentions, is as satisfactory a speculation as any in which a capitalist can engage." He also gave a short sketch of the manufacture of fraudulent companies, which do so much injury to mining.

In all this Mr. Hunt has shown us, and not for the first time, that genius can throw a halo of interest around the dullest subject; but as in some pictures, minor tints or shades are introduced which, from particular causes, may leave a more lasting impression on the mind than the main subject of the picture itself—so the dark shadow of Mr. Hunt's paper appeared to me as though it produced more effect upon subsequent speakers than he intended that it should. And I would observe in the first place, as a public journalist for the last 25 years, engaged in supporting legitimate mining, and in exposing and condemning those bubble companies described by Mr. Hunt, that although the general truthfulness of his description of such companies must be acknowledged, experience shows that they are not by any means confined to mining pursuits, and bear, indeed, a small proportion to the number which have been promoted in banking, in railways, and other commercial undertakings; and while the very speculative character of mining offers more than usual facilities to designing adventurers, Mr. Hunt might as well have called the late British Bank a specimen of English banking, as the bubble company he described an illustration of British mining in its integrity, and as pursued on a large scale throughout the United Kingdom.

In the next place, Mr. Hawes remarked upon the fact that about 350,000 persons were employed in the production of minerals of the value of thirty-five millions per annum, which gives, as he said, "the production of each miner not more than about £2 per week each; an amount so small, that he could hardly conceive it possible that it would remunerate the large capital which was invested in these mines." I confess I am at a loss to understand this sort of reasoning upon the subject, or to find out by what means Mr. Hawes arrives at his conclusions.

If a farmer takes 1,000 acres of land to cultivate, he must spend, even in such a certain pursuit, a capital of £10,000 before he can get a return for his outlay; and in mines, where there is great uncertainty and delay, it sometimes happens that £50,000 or £100,000 have to be expended before remunerative returns can be made.

During the last 18 years, the profits paid by mines in Cornwall and Devon amount to £4,529,285 12s., and the average number of profitable, or dividend mines per annum during that period has been about 43. Many young mines, employing a large number of hands, have not yet made any returns whatever, and are entirely carried on by the capital of shareholders. A still greater number make returns trifling in proportion to their cost of working; but out of these classes of progressive mines, a few every year become profitable, and by this sort of legitimate speculation, the mineral returns, so important to the arts, science, and commerce of the country, are kept up; and I do not see in any way how sound calculations can be formed on the basis of Mr. Hawes's remarks. Out of the 350,000 persons employed, a very large proportion consists of girls and children, whose pay is about 10d. per day, and the average amount received by the whole 350,000 will not be more than 12s. per week each.

Mr. Hunt referred to, and indeed the *Journal* has given very copious extracts from, the mineral statistics that he publishes annually, and I hope he will pardon me for suggesting that they should be published earlier in the year. The returns of 1861 appeared in November of the present year, and much of their very great value, as works of reference, is thus lost. I mention this because I am told the fault rests not with Mr. Hunt, but with the "Circumlocution Office."

Twenty-one years ago, in 1841, when mining statistics were as difficult to obtain as agricultural statistics are at the present day, I commenced a work, the first in modern times, to call public attention to the mineral resources of this country, and it occupied me two years to collect the statistics required for it. But afterwards the task became comparatively easy, and for many years past I have been able to publish the annual returns of the principal metallic mines the first week in January; and the publication of the returns of our collieries, &c., not more than a month later, would be an invaluable boon.

I could have wished, also, that Mr. Hunt had given us his own idea of the formation of mineral veins, and was surprised that no reference was made in his paper to electricity. It is well known that all our large deposits of mineral are found in the vicinity of, or in contact with, cross courses, or veins of clay, elvan, &c., &c., running in a different direction to the mineral veins; and without such interruptions to the general strata a mine is considered of little value; and one theory in reference to this is, that these cross-courses interrupt the current of electricity passing through metallic veins, and the minerals held in solution are thus condensed, and form large bodies of ore. While on the subject of electricity, I would add that to its agency, also, it is supposed "dowsing" or using the "divining rod"—the existence of which, Mr. Rawlinson says, "is a serious reflection upon the age"—owes its powers. I am not a believer in the art myself, but some years ago I went on a "dowsing" expedition with a friend in Cornwall, accompanied by a professor and firm believer in it, and a description of the process may not be uninteresting. The "dowsing" or "divining" rod is a hazel twig, with two branches like the prongs of a fork. The "dowser" grasps one of the prongs in each hand as firmly as he can, presses his elbows close to his sides, and by a movement of the wrist turns upwards that part of the rod which would be represented by the fork handle. This position is a most constrained one both for nerve and muscle; and in it, myself, friend, and dowser marched like skirmishers across several fields where lodes were known to crop nearly to the surface, without any result except to the professor, whose upraised portion of the rod dropped down once or twice with a sudden jerk, and each time, as the "dowser" declared, when he passed over the back of a mineral vein; and the only explanation I could get was suggested by my friend, that some persons were particularly susceptible of electrical influences; and that in the very constrained position they placed themselves in when "dowsing," their nervous systems were affected by the electric currents in the mineral veins passed over, and the power to sustain the rod in its upright position lost. At any rate, as many persons who have heard of this "divining rod," may never have heard the manner of using it explained, I describe it just as it took place—even at the risk of being told that "it is a reflection upon the age we live in."

In conclusion, I would add, in reference to mining speculations and Professor Tennant's remarks, that, from the fact of my having published, in addition to other works, a review of the Progress of Mining, every year for the last 19 years, I have, perhaps, been consulted in these matters as much, or perhaps more, than any other person in London, and my advice has been:—1st. Never speculate at all, unless

with money you can afford to lose. 2nd. Never embark in any mine whatever, and particularly such as are offered through the means of prospectuses, in large numbers of shares, without obtaining the honest advice of a practical, disinterested agent in the district where the mine is said to be, and this can always be had for a fee of £2 2s. 3rd. In embarking, even in profitable mines, never confine yourself to one, but, on the principle of insuring ships at Lloyd's, divide your risk into five or six sound undertakings, and, in the aggregate, success will attend you.

Were these rules adhered to, we should have few bubble companies to complain of, and mining would take the rank that its importance demands.

I am, &c.,

J. YELLOLY WATSON, F.G.S.

Effra House, Brixton, Dec. 20th.

Sir,—Mr. Hunt's paper, read last Wednesday evening, was certainly one of the most interesting on this subject I have ever listened to, showing well the use he has made of the various means in his power of acquiring an acquaintance with the subject. Referring to the manner in which mine companies are got up, I may say I agree with him to a great extent in what he has stated—indeed, what I daily see, and the numerous letters I get on the subject, prove the extent to which many are wilfully deceived. But there is one class of miners to which, in justice to them, I think prominence enough was not given, and that is the class of "honest men," who, when any of them have decided on searching for mineral in a piece of ground (or mine sett), or on the re-working of some ancient mine which may seem to hold out good chances of success, invite their friends and connections to join them, and go on with it on the same terms as themselves, that is without those now very large and fashionable premiums which unprincipled projectors often state as "purchase money," and put into their own pockets. Men of this class deserve support, and are generally successful. They must be regarded as quite a distinct class from those who "mine" only in the pockets of adventurers. I am myself largely connected with a mine divided into less than 1,000 shares, the total outlay on which is not so much as £6,000; but for this comparatively small sum we have cleared up an old mine, about 100 fathoms deep from the surface, furnished it with a 24-inch cylinder pumping engine, and 18-inch cylinder drawing engine, water stamps, and all pitwork and other machinery complete, and I think it will now soon give profits. Mining in this way may, I think, be considered fairly safe, and I mention this as one instance going to prove that it is a good medium for investment and speculation.

I have very little doubt that water plays a very important part in the deposition of ores in veins. This and electricity, I think, are the prime agents. We know well the depositions from water which flows over or through iron-stone beds. It deposits iron very freely after such passage, on its further route.

In the "Relistian" mine, in Gwinear, Cornwall, many years since, when it was re-opened after having been closed a very long time, and having been previously productive of tin—on this re-opening, a great quantity of the crystals—some of them very fine—of the oxide of tin were found deposited against the sides of some of the levels; and in another old mine, my father has mentioned to me that he had seen crystals of tin formed or deposited in an old shoe! These plainly show that the tin must have been held in solution by the water, and deposited under some very peculiar circumstances, in the positions named. In the Museum at Penzance also there is part of a stag's horn, a portion of which looks as if it had been converted into oxide of tin, and crystals of the same cover part of the remaining portion. "Cross lodes" and "elvan courses" play a very important part in deposits of ores, the largest and richest branches of ores, especially copper, being found generally in connection therewith. However, I will go no further in this subject at present. I was very glad to hear Mr. Hunt reply to Professor Tennant's remarks on the ignorance of "mine agents." Mr. Tennant had, unfortunately, by some means, come across an ignorant man, and forthwith selected him as a type of his class. Nothing could be more absurd; no party of adventurers, having the smallest regard for their own interests, would select a man to look after their mine who did not know well the common forms of the common ores of tin, copper, arsenical and sulphuric, mundic, &c., &c.

Mr. Hawes referred to the statistics of Mr. Hunt, in which it was stated that about £35,000,000 worth of ores were annually produced by 350,000 persons employed in their production, or a produce of little more than £2 per week, per head; deducing from this mode of calculation the impossibility, after paying these persons so employed, of obtaining any remuneration for the capital invested in mines themselves. This mode of calculation is erroneous, inasmuch as a great proportion of the persons employed in mines are boys and girls, who do not get more than a very few shillings per week. There are also other considerations against this view of the case.

I am a miner, and the son of a miner; I have been engaged therein from my earliest youth, and I am convinced of this—that, with ordinary caution (as in other speculations), and with perseverance, it is a pursuit that pays well, and is as legitimate a business as any under the sun. Suppose all were to stop mining, from its "risky" character, where would Britain be in a few years without her minerals and the endless industry created thereby? It is perfectly true that our knowledge of the laws which regulate mineral deposits is very limited, but there was a time when the various processes for the manipulation of iron ore, puddling, &c., were almost unknown; and we have reason to hope that, now so much attention is being drawn to this, the hidden processes of nature and her action as regards mineral veins will be investigated in such a way as to lead to some results towards the desired end. Already many of our best mine agents, although they cannot say that the ore shall and will be found to a certainty in a certain spot, can with tolerable certainty pronounce that it *will not* be found in certain situations, and this is one link in the chain.

Nature's own operations in the crust of the earth are very slow, vast periods of time being required to produce the various changes therein—periods of time in comparison to which science is in its veriest babyhood. It is not, then, to be wondered at that some of nature's greatest laws are but very faintly understood by poor mortal, fleeting man—man who, though he may record for succeeding man all he may have acquired, yet his life is so very short that ere his mind has properly adapted itself to its great research, old age and death come on him, and he leaves his reasons, thoughts, and opinions to others for re-digestion and consideration, who in turn go off the stage in the same manner.

In conclusion, I cannot help making a remark on the facility and contentedness with which the public spend their money in *foreign* mines. Many millions have been recklessly thrown away in foreign mining without one word of complaint, while if a few thousands happen to have been unfortunately laid out at home, what a grumbling and discontent there is.

Mining is, in its very nature, *risky* and very speculative, and occasional losses as well as large profits must be expected and allowed for. It is also very "charming." "The Pleasures of Hope" are pretty well known to those who embark in it freely—but I again say that those who do so embark *judiciously* generally do fairly well.

I am, &c.,

JAMES HOLLOW.

Lelant, Hayle, Cornwall, December 18, 1862.

Proceedings of Institutions.

BACUP MECHANICS' INSTITUTION.—In the last occasional circular, dated December, 1862, the directors rejoice that a measure of success has attended their efforts to provide instruction, combined with rational amusement, in the course of Wednesday evening lectures and entertainments which has been organised and in part carried out. That these efforts are appreciated by the members and the public, the large and influential audiences which have assembled on each occasion afford sufficient testimony. The directors in issuing this, their second circular, point with satisfaction to the lectures yet to be delivered, embracing, as they do, subjects of high and varied interest, and opening up to the members refined sources of enjoyment calculated to improve the understanding and purify the taste. The directors earnestly solicit the continued patronage of the wealthier portion of the community to these lectures. The cost of their arrangement is considerable, and it would be a matter for regret that in a pecuniary sense they should prove unsuccessful. The directors ardently desire that the Institution may be enabled to tide over the present time of depression without incurring any debt, and to this end they urge the members, individually, to exert their influence in obtaining others to join, by pointing out the advantages to be derived from a connexion with the Institution. The following are the arrangements for lectures:—December 3rd, Mr. D. W. Greenhalgh, of Stubbins, on "The Air We Breathe," illustrated by apparatus and numerous experiments; December 10th, Robert Crossland, Esq., of Bury, "Lord Brougham, the Orator and Statesman;" December 17th, Rev. T. Lawson, of Bacup, "Popular Proverbs," and a selection of music by the tonic sol-fa class; January 14th, Rev. J. Swann Withington, of Rawtenstall, "A Trio of Great Men of Our Nation:—Cromwell and Government, Newton and Philosophy, Milton and Poetry;" January 21st, Mr. J. P. Meaden, of Haslingden, "Combustion, and some of its Phenomena," illustrated by numerous experiments; January 28th, David Thomas, Esq., of Bury, "America, Past and Present;" February 11th, Rev. H. C. Anson, of Cloughfold, "The Brain and Nervous System," illustrated by numerous drawings and casts; February 18th, Mr. A. Stansfield, of Todmorden, "Electricity," illustrated by numerous experiments; February 25th, T. T. Wilkinson, Esq., F.R.A.S., &c., of Burnley, "The Popular Customs and Superstitions of Lancashire;" March 4th, William Mitchell, Esq., of Waterfoot, "Athletic Sports;" March 11th, Thomas Baldwin, Esq., C.E., of Bury, "The Steam Engine—Heat, what is it? Steam, its nature and action—The Steam Engine, its effects on the social condition of man;" March 18th, A. Fletcher, Esq., M.D., of Bury, "The Marvels of the Invisible, or an Evening with the Microscope," illustrated by microscopic specimens; March 25th, Joseph Chattwood, Esq., of Bury, "Readings from an Old Manuscript," illustrated by geological specimens. The library contains upwards of 1,500 volumes, in every department of literature, and additions are constantly being made. It is open on Tuesday evenings, from eight to half-past nine, and on Saturday evenings from half-past six to eight o'clock. The news-room is open daily (Sundays excepted) from eight a.m. to half-past ten p.m. The chemistry class is under the management of Mr. H. P. Meaden, of the East Lancashire Union of Institutes, and is in union with the Science and Art Department, South Kensington, in the annual examinations of which the pupils are entitled to compete. Classes in all the ordinary branches are taught, and as the Institution is in union with the Society of Arts, London, the East Lancashire Union of Institutes, the Lancashire and Cheshire Association of Institutes, the members have the privilege of competing in the various examinations which take place annually, in all of which prizes and certificates are awarded. The female classes, for the study of the elementary branches, meet two nights in each week, and are conducted by a qualified female teacher. The various examinations are open to the members of these classes. The local annual examination of the evening classes will take place in March next, when prizes of considerable value will be awarded to the successful candidates. The annual coffee party was to be held on Christmas Eve, December 24th. The annual *soirée* will take place on Friday, the 2nd January, 1863. Thos. Bazley, Esq., M.P. for Manchester, and other gentlemen, are expected to be present and take part in the proceedings. P. Delavanti, Esq., and others are engaged for the occasion.

To Correspondents.

ERRATUM.—In the last number of the *Journal*, p. 98, col. 1, line 4, for "prohibited" read "protected."

MEETINGS FOR THE ENSUING WEEK.

TUES. ...Royal Institution, 3. Professor Frankland, "On Air and Water." (Juvenile Lectures.)
THURS...Royal Institution, 3. Professor Frankland, "On Air and Water." (Juvenile Lectures.)
FRI.......Philological, 8.
SAT.......Royal Institution, 3. Professor Frankland, "On Air and Water." (Juvenile Lectures.)

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

Dated 29th November, 1862.

3202. T. Lloyd, Liverpool—Imp. in and applicable to the wheels of vehicles.
3206. J. C. Robertson, Gracechurch-street, and W. C. White, King-street, Regent-street—An improved tap or cock.
3208. D. Sutton, Banbury, near Oxford—Imp. in apparatus for washing linen and other fabrics and garments.
3210. R. K. Penson, Ferryside, Carmarthenshire—Imp. in apparatus used for warming railway carriages. (A com.)

Dated 1st December, 1862.

3212. H. L. Emery, 72, Sloane-street, Chelsea—Imp. in thrashing machines.
3214. G. F. Griffin, New Adelphi Chambers—Imp. in the permanent way of railways.
3316. J. Irwin, Wellingborough, Northamptonshire—An improved machine for cultivating land.
3224. A. V. Newton, 66, Chancery-lane—Imp. in the construction of steam and other vessels. (A com.)

Dated 2nd December, 1862.

226. H. Twelvetrees, Bromley—An improved sawing, filing, mortising, and turning apparatus.
3228. P. Brassert, St. Anne's-road, Brixton—Imp. in apparatus for saving life and property in cases of fire and burglary.
3232. T. Cook, Manor-place, Walworth—Imp. in envelope folding machinery.
3236. A. P. Charles, High-street, Wapping—Imp. in candles and night lights, and in the lamps or apparatus for burning the same.
3238. H. J. Simlick, Osborne-place, Whstechapel—Imp. in the manufacture of cigars and pipe lights.

Dated 3rd December, 1862.

3240. H. Wilde, Manchester—Imp. in electro-magnetic telegraphs, and in apparatus connected therewith.
3242. R. B. Thomas, Anderton, Devonshire—An improved apparatus for turning over the leaves of music.
3246. I. I. Abadie, Rue de Mulhouse, Paris—Imp. in the manufacture of imitation lace and guipure veils and other analogous articles.

Dated 4th December, 1862.

3250. J. Grant, Albion-place, Maidstone—Imp. in the construction of turn-tables for portable railways.
3252. J. Braddock, Droylesden, Lancashire—Certain imp. in machinery or apparatus for effecting the separation of impurities from the water employed in steam boilers, and also for effecting the circulation of the said water.
3254. G. Lewal, 74, St. George's-road, Pimlico—A hot-air apparatus in cast-iron or any other metal or substance consisting of prismatic tubes, to be applied to chimnies with flues and heat conduits. (A com.)
3256. J. Robinson, Liverpool—Imp. in the construction of ships and vessels.
3258. R. Wallis, Basingstoke—Imp. in apparatus for loading and unloading vessels and transporting sacks, casks, and other packages or parcels from one landing-place or stage to another or to or from one warehouse to another.

3260. T. G. Webb, Manchester—Imp. in the manufacture of articles of pressed glass.

[*From Gazette December* 12*th*, 1862.]

Dated 17*th October*, 1862.

2803. J. Summerton, Smethwick, Staffordshire—Certain imp. in harrows for harrowing land,

Dated 29*th October*, 1862.

2912. W. Clark, 53, Chancery-lane—Imp. in apparatus for ascertaining and recording the speed and distance travelled by vehicles, the flow and quantity of water, and other analogous purposes. (A com.)

Dated 6*th November*, 1862.

3007. Major-General W. N. Hutchinson, Plymouth—Imp. in apparatus or means for protecting the screw of steamers from becoming entangled with or fouled by ropes or other bodies.

Dated 12*th November*, 1862.

3047. T. Bradford, Fleet-street—An improved clothes wringer and mangler, applicable to pressing the liquid from clothes in the process of washing and other pressing purposes.

Dated 13*th November*, 1862.

3055. G. W. Rendel, Newcastle-on-Tyne—An improved method of strengthening armour plates made of carbonised iron or steel.

Dated 20*th November*, 1862.

3120. J. W. Child, Halifax—Imp. in means and apparatus for working wool and other fibres.

Dated 21*st November*, 1862.

3131. J. Steart, 5, St. James's-road, Blue Anchor-road, Bermondsey—An improved method of extracting the fibre from zostera marina and other aquatic vegetable productions.

Dated 24*th November*, 1862.

3155. W. Tatham, Rochdale—Imp. in machinery or apparatus for preparing and spinning cotton, wool, flax, and other fibrous materials.

Dated 25*th November*, 1862.

3166. W. Longley, Leeds—Imp. in machinery for making bricks.

Dated 27*th November*, 1862.

3177. A. A. Pheloux, 75, Rue Quincampoix, and P. A. Paumier, 9, Rue Christine, Paris—A new atmospheric sailing propeller.

3179. T. Keyworth, Boston, Lincolnshire—Imp. in motive power machinery.

3183. D. Veerkamp and C. F. A. V. Trigt, 11, Mercer's-terrace, Limehouse—Imp. in the treatment of old manufactured fabrics, in order to obtain useful fibrous products therefrom.

3185. W. Clark, 53, Chancery-lane—Imp. in gas burners. (A com.)

Dated 28*th November*, 1862.

3186. J. Carbonell, 15, Passage des Petites Ecuries, Paris—Imp. in preparing, manufacturing, and washing the paper pulp derived from the esparto plant, and in apparatus connected therewith.

3187. W. A. Waddington, 44, Stonegate, York—Imp. in machinery for cutting wood.

3189. J. H. Johnson, 47, Lincoln's-inn-fields—An apparatus for indicating the pressure of electric conductors in foreign bodies. (A com.)

3191. J. Cresswell and E. T. Greves Birmingham—Imp. in the construction of hearses and funeral carriages.

3192. S. J. Browning, Portsmouth—Imp. in machines to be employed in brewing.

3193. W. Clark, 53, Chancery-lane—Imp. in the permanent way of railways. (A com.)

3195. J. F. Delany and J. C. R. Okes, Victoria Foundry, Greenwich—Imp. in double cylinder expansive steam engines.

Dated 29*th November*, 1862.

3199. T. Blackburn and M. Knowles, Blackburn—Imp. in looms for weaving.

3200. F. G. Taylor, Manchester—Imp. in washing machines.

3201. J. Crompton, Bolton—Imp. in machinery or apparatus for ploughing, harrowing, clearing, and drilling land.

3024. W. Clark, 53, Chancery-lane—An improved machine for cutting corks and other stoppers. (A com.)

3205. F. Vacher, Parliament-street—Imp. in ornamenting playing cards.

3207. Rev. H. Moule, Fordington, Dorsetshire—Imp. in locomotive engines, and in apparatus for generating steam for steam engines.

3209. J. Anderson, Royal Arsenal, Woolwich—Imp. in the manufacture of the tyres of railway wheels, and rails, switches, and crossings of railways.

3211. M. Henry, 84, Fleet-street—Imp. in the manufacture of leather. (A com.)

Dated 1*st December*, 1862.

3213. P. Bourne, Whitehaven—Imp. in miners' lamps.

3215. T. Waller, Fish-street-hill—Imp. in stoves.

3217. R. Flude, Aylestone-street, Leicestershire—Imp. in looms for weaving narrow fabrics.

3216. J. Romer, Shipbourne, Kent—Imp. in the manufacture of bullion wire and metallic fine drawn wire.

3220. W. Clark, 53, Chancery-lane—An improved apparatus applicable as a pump, water meter, hydraulic motor, or a steam engine. (A com.)

3221. P. W. Reuter, Buckland-crescent, St. John's-wood—The preparation of a new compound to be used for dyeing and printing purposes. (A com.)

3222. E. D. Johnson, Wilmington-square—Imp. in pocket watches.

Dated 2*nd December*, 1862.

3225. H. Twelvetrees, Bromley, Middlesex—Imp. in apparatus for cleaning knives, forks, and boots.

3227. H. Twelvetrees, Bromley, Middlesex—Imp. in washing, wringing, and mangling machines.

3230. G. F. Blumberg, Cannon-street West—An improved method of, and apparatus for, producing designs in or on glass.

3231. Capt. J. Wheatley, R.N., 9, Glucks Strasse, Munich—Imp. in the construction of ships of war and in the manufacture of armour plates for ships, forts, and batteries.

3233. G. T. Bousfield, Loughborough-park, Brixton—Imp. in forming the permanent ways of railways. (A com.)

3234. G. T. Bousfield, Loughborough-park, Brixton—Imp. in apparatus for discharging guns or ordnance. (A com.)

3235. D. Graham, Edinburgh—Imp. in steering and manœuvring ships or vessels, and in the apparatus employed therein.

3237. R. K. Cautley, Thorney, Cambridge—Imp. in electro thermal baths. (A com.)

3239. B. Browne, 49, King William-street—Imp. in the construction of knobs or handles of door locks, and in the mode of connecting the same with the sliding bolts thereof for advancing and drawing back said bolts. (A com.)

Dated 3*rd December*, 1862.

3241. A. T. Becks, Birmingham—Imp. in machinery for cutting or shearing sheets or plates of metal.

3243. C. F. Claus, Fearnhead, Lancashire—Imp. in carboy hampers and in the machinery or other means for manufacturing the same.

3244. A. Morton, Arbroath—Imp. in lawn-mowing machines.

3245. W. H. Browne, 29, Alwyne-road, Canonbury—Imp. in gas stoves.

3247. A. F. Eden, Threadneedle street—Imp. in apparatus for taking minute photographic pictures and magnified pictures of microscopic objects.

Dated 5*th December*, 1862.

3264. T. E. Blackwell, Orsett-terrace, Hyde-park—Imp. in barometers or instruments for measuring altitudes or the pressure of the atmosphere or elastic fluids.

3268. E. Walton, Wood-street—An improved article of wearing apparel for the neck.

Dated 6*th December*, 1862.

3272. J. Craig and M. Craig, Kilmarnock—Imp. in apparatus for the manufacture of clay.

3274. W. McNaught, Rochdale—Imp. in machinery for washing and drying textile fabrics and materials.

3276. J. Burchall, St. Helen's, and E. Burrows, Sutton, Lancashire—Imp. in propellers for ships and other navigable vessels.

3278. R. McClintock, Dublin—Imp. in carriage axles.

Dated 8*th December*, 1862.

3286. R. A. Brooman, 166, Fleet-street—Imp. in kneading machines. (A com.)

Patents Sealed.

[*From Gazette, December* 19*th*, 1862.]

December 19*th*.

1850. W. Hargreaves, and G. H. Leather.
1851. T. Carr.
1868. J. Whitham.
1869. G. Turner.
1876. J. Parkes.
1882. J. Watson.
1888. R. A. Brooman.
1889. A. H. Martin.
1890. I. Holden.
1891. A. A. Croll.
1897. G. H. Hulskamp.
1898. J. Garnier.
1901. J. Tatham.
1902. J. Petrie.
2585. C. Mertens.
2693. T. Keech.
2754. C. McCarthy.
2805. J. Davies and G. Davies.

[*From Gazette, December* 23*rd*, 1862.]

December 23*rd*.

1905. J. Wall and T. Dodd.
1906. W. Thomas.
1922. J. M. Dunlop.
1943. J. Miles.
1973. A. Gilbey.
1976. C. F. W. Rust.
2009. J. H. Johnson.
2042. R. Dunn.
2064. W. E. Newton.
2080. A. Fournier.
2096. A. Vignon.
2121. T. Sagar and J. Rocliff.
2237. H. B. Barlow.
2627. C. D. Abel.
2867. G. J. Firmin.
2736. H. A. Marinoni.
2935. G. Haseltine.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, December* 23*rd*, 1862.]

December 17*th*.

2883. G. S. Goodall.
2898. G. Collier and J. Collier.

December 18*th*.

2900. W. Henderson.
2946. W. E. Newton.

December 19*th*.

2896. J. Willcock.
2906. J. H. Johnson.
2950. T. S. Truss.
2975. T. S. Cressy.

December 20*th*.

2892. J. Fairclough.
2909. S. Plimsoll.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, December* 23*rd*, 1862.]

December 20*th*.

2909. J. Chesterman.

Journal of the Society of Arts.

FRIDAY, JANUARY 2, 1863.

NOTICE TO MEMBERS AND INSTITUTIONS.

Exhibition Catalogues.

Her Majesty's Commissioners for the International Exhibition of 1862 have placed at the disposal of the Council, for distribution to the Members of the Society and Members of the Institutions in Union, copies of the Industrial and Fine Art Catalogues.

Members of the Society desiring to have copies of each of these Catalogues may have them on application, either personally or by an authorised agent, at the Society's House.

Secretaries of Institutions in Union may have a number of copies placed at their disposal for distribution amongst their Members, on making a similar application, specifying in all cases the number required.

General Index.

A general Index to the first ten volumes of the *Journal* is in the course of preparation, which may be bound with the last volume. Members who desire to have copies (which will be supplied *gratis*) are requested to apply to the Secretary as early as possible, in order that a sufficient number may be printed. As soon as it is printed it will be sent to each member who has made application for it.

NOTICE TO MEMBERS.

A few copies of "Essays on the Dwellings of the Poor and other Subjects," by Mr. Rufus Usher, have been placed at the disposal of the Council for distribution among the members. Any member desiring to have a copy should apply to the Secretary.

AWARDS OF MERIT AT INTERNATIONAL EXHIBITIONS.

(*Continued from page* 107.)

In August last the Council of the Society of Arts issued a letter, inviting the opinion of the Jurors, the Commissioners for the Colonies and for Foreign countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and requesting replies to the questions given below, with the intention of embodying the answers in a public report.

AWARDS OF JURIES.

1.—Are you of opinion that Awards for Merit, by medals or otherwise, in International Exhibitions, are desirable?

2.—State the reasons for your opinion.

3.—Ought Works of Fine Art and Designs to be excluded from the awards?

4.—Can you suggest any better method than the appointment of jurors for making the awards?

5.—Can you suggest any improvement in the constitution or proceedings of the juries?

6.—Is any appeal from the decision of the juries desirable?

7.—If you think awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?

8.—Have you any further suggestions to offer on the subject?

The following is a summary of the replies received. The figure attached to the replies correspond with those of the questions:—

Gordon W. Clark, Juror, Class IIIc, confines his observations to his experience in this class only.—1. Certainly not; the difficulties of making awards too great. 2. Because such awards give a very false impression to the public, who naturally look upon a prize article as the best of its kind, whereas it is often of a very inferior description, but has obtained a medal as being the best that can be exhibited, considering the circumstances under which it is produced. A striking example may be found as an illustration in the wines from the north of Spain. As a rule, these are of a most inferior order, and wholly unsuited to the ordinary requirements of trade, and are useable only in the country of growth; but several obtained medals because great care and skill had evidently been employed in making the best possible produce with the materials at hand. But this the public cannot judge of, not knowing all the circumstances, and they are misled by such produce being rewarded. 4. If awards are to be made, I know of no other way than by appointing juries; but more care should be exhibited in their selection, especially of the foreign jurors. 5. Independent of the juries who are to make the awards, there ought to be a body of gentlemen well conversant with the articles of each class, whose duty it should be to arrange the products in each section in some systematic fo m, and according to a recognised plan, and to see they are presented *seriatim* to the jury in this form, and thus avoid the constant confusion that arises from each country putting forward its products in any way the Commissioners may think proper. In the Exhibition of this year, the want of any arrangement by some of the Commissioners has been very troublesome and confusing, and increased considerably the labour of the juries. 6. Does not consider any appeal desirable. If the jurors are properly chosen, they ought to be the best judges. Everybody who was not rewarded would appeal on the chance of a decision in his favour. 7. No other means are needed. Experience shows that those engaged in every department of trade thoroughly understand the articles used in that branch, and competition is now so keen that any really meritorious production is sure to be well taken up by some one if he sees the merit and his own advantage. The best test of merit is the approval of the public, and by giving awards you mislead rather than guide their judgment. 8. Does not think wines and spirits are at all fit produce for such awards, but if any awards are to be made, would establish one medal for the best specimen of each description of goods exhibited in each class, according to certain regulations as to growth, age, &c., and in case of equality two might be awarded, and I would then allow jurors to call attention, by honourable mention, to any things they deemed worthy of such notice, but medals should really represent excellence, and not merit only.

Thomas Clegg, Manchester.—1. Yes. 2. Because they bring an exhibitor into notice, and stimulate him to

new efforts. 3 Doubtful. 4. No better plan than properly selected juries. 5. Exhibitors should choose jurors; every exhibitor having power to challenge, and Commissioners to have power to exclude and put another in his place. No award unless three-fourths of jury concur. 6. No appeal; but, if desired, then parties aggrieved might select one Englishman and one foreigner, and the jury one Englishman and one foreigner, the exhibitor one of each, and the Commissioners one of each. Practically no appeal necessary. Complaints are forgotten after a short time.

Daniel J. Collins, Exhibitor, Class XVII.—1. Yes. 2. Bring meritorious productions forward, and guide public opinion. 3. Should not be excluded. 4. Juries the best. 5. Commissioners should appoint juries and furnish lists to exhibitors, and consider any reasonable objections to list; one *bonâ fide* manufacturer and one working man at least should be appointed. Due notice of examination by the jury should be given to each exhibitor. 6. Appeals not generally desirable, but should be allowed in certain exceptional cases. 8. Distinction should be made between mere exhibitors and the manufacturer and artist designer.

Robert H. Collyer, M.D., F.C.S., Exhibitor, Classes IVc. and XXVIIIb.—1. Some mark of distinction desirable. 2. Stimulate exertion to increased excellence. 3. Works of Art should not be excluded. 4. The defect in the present constitution of juries consists principally in the fact that some of the jurors are incompetent to decide on the merits of the subject submitted to their decision. 5. The conclusions arrived at in a great many instances have been erroneous, principally arising from the exhibitor not having been able to communicate to the jury the particular features of novelty and improvement relative to his invention or mode of manufacture. Therefore advises that, whenever practicable, the inventor or exhibitor should have access to the jury, in order that every source of information should be made available. No juryman should adjudicate except he had been selected by his own craft, as competent to fill so important a position. 6. No appeal if jury properly constituted. 8. The number of awards on the present occasion has been so great as to be of little or no value to the possessor; one gold medal for best production to each distinct speciality would be ample; two silver medals for the next best, and honourable mention for those deserving of it; the special reason for which the medal is given should be stated in detail; the medal itself should have the names of the jurymen engraved on it, with that of the exhibitor.

Messrs. Copland and Co., Exhibitors, Class IIIb.—1. Yes. 2. Give an impetus to manufacturer to improve. 3. See no reason why works of Fine Art should be excluded. 4. Properly appointed jury the best mode. 5. Judging by the awards at the present Exhibition, consider the jurors displayed great incompetency; juries should examine the manufacturers *vivâ voce*, and the articles manufactured should be guaranteed of same quality as those exhibited. 6. Awards should be final except in special cases. 8. If no competent juries can be obtained no awards should be made. Award of medals as at last Exhibition does great injury. In Class IIIb. great injustice has been done.

John Coryton, Exhibitor, Class XII., prefaces his answers by stating that he is one of a class of individuals who, having arrived at the conclusion that a long established system of manufactures is conducted on erroneous principles, desire to accomplish a reform in it, and to promote public discussion for that purpose by the exhibition of improved models, but are not in a condition to carry out the requisite experiments, and consider that a *quasi* judicial investigation requiring a high order of intelligence and scientific acquirements is necessary 1. Thinks medals objectionable. 2. The practical working of the present system is that the exhibitor places his medal in his window, and a print of it on his circulars, and thereby secures from the public an advantage over his brethren in trade which is for the most part wholly undeserved. Instances exhibitors of jewellery, papeterie, fishing-tackle, and the like, in which scarcely any meritorious connection exists between the objects exhibited and the exhibitors. To persons situated like himself, a medal is absolutely valueless, inasmuch as the award would not weigh for a moment with the authorities at the Admiralty in inducing them to institute experiments or inquiries into the proposed plan. 4. Complains that though in attendance to explain his models to the jury, it was painfully apparent that the gentleman to whom he was told to address his observations did not understand the drift of them. 5. A list of 20 or more men eminent for their special knowledge should be submitted to the exhibitors for Jury, and a certain number, say six, voted for by them. 6. An appeal undesirable. The value of the present awards has been much impaired by the indecision of the Committee. 7. The jury should make a special report in the case of each exhibitor, more especially where new principles are concerned in manufactures, and a certified official copy of such report should be given to each exhibitor. 8. The office of juror should be well paid, and the remuneration should be dependent on their attendance. The jurors might in such case discharge the duties now performed by the superintendents of classes. Major Moffatt, Superintendent of the Department of Naval Architecture, is an officer of engineers, and, either from ignorance of the subject, or from inattention, placed the whole of this exhibitor's models under the head of "boats," a totally erroneous classification, and one which induced Admiral Washington to inform the writer that "general principles" could not be gone into.

Thomas Ogden Dixon (Firm of John Dixon and Sons), Steeton, near Leeds, Exhibitors, Class VII.—1. Not as awarded on the present occasion. 2. Because capable men were not known to those having choice of jurors. 3. Would include Fine Arts. 4. Jurors should be appointed out of the special trades. Members of the Society of Arts, of the particular trade under consideration, should be asked to name jurors, from whom the Commissioners should select one to act for the special trade. 5. There are some classes in which the jurors have no knowledge of the subject, and hence great mistakes. One award only should be made in each trade. If advice needed, the juror should ask the assistance of his colleagues. 6. None, when practical men are appointed. 7. Would suggest that awards should be cut down to as small a number as possible, and after the articles had been classified, those to which awards are allotted should be ascertained exactly. These should, after the decision of the jurors, be illustrated in a volume, with as short a description in letter-press as practicable, to specify the particular qualifications which merited the award. Each successful competitor should then be presented with a copy, to serve in place of a medal. 8. Would call the attention of the Society to agricultural meetings, and wish them to observe how the members of such meetings appoint their judges, and what satisfaction they seem to give. The International Exhibition, though on a more extended scale, would be benefited. Believes in observing and carrying out the principle of these shows in the choice of men most capable of exercising a practical judgment. Would suggest that foreign jurors in future be excluded from the list of jurors. Would let an Exhibition in England be judged, so far as awards are concerned, by Englishmen alone; and, if the Society thought fit, they might organise their members in different districts to point out men capable of filling posts as jurors; these men, having a particular responsibility, would act with caution, and render justice more certain than it has been on the present occasion.

A. Domeier, Commissioner for Hanover.—1. By no means, as far as regards the Exhibition of 1862, to which the remarks on the following points refer in

particular. 2. There being only one class of medals, and a very large number in proportion to the number of the exhibitors, many second-rate or third-rate productions were honoured with the same distinction as the first-rate ones, and this deceives the public, because they must think that all such goods as got medals are of equal merit, particularly as generally, not even in the reasons stated for the award, was a difference made between the different productions. At the same time this causes an injustice to the manufacturer, who has taken a great deal of trouble to arrive at producing better or cheaper goods than his neighbour, and his reputation loses among a great many of the buyers of his goods, since they think that all those who get the same distinction produce goods of equal merit. Further, it is of no value whatever to him as regards those who are well informed on the subject, because they know that in a great many instances the juries did not appear to be aware that the goods to which they awarded medals were not exhibited at all. 4. No. 5. Every person accepting the appointment of a juror ought to bind himself to be present at the examination of the objects, and also at the discussions in committee. The president ought to adopt an efficient system for seeing that all the articles in his class are examined. He also ought to enter in a book against each article the opinion of each juror, which would prevent mistakes to a great extent. Before the printing of the reports, there ought to be a general revision to see that all articles have really been examined. Each exhibitor ought (foreign ones through their commissioners) to send to the president of the class in which his goods have been exhibited two copies of a short statement of what he thinks desirable to communicate for the information of the jury, and also the price for which his article can be sold in quantities, one copy of which ought to be returned to him, with a note at the foot stating that his goods have been examined. As soon as this has been done, such statements ought to be copied on paper, of a certain size, with a margin on the side, so that they can be sewn together in the form of a book. There ought to be established a proper medium for the exchange of goods improperly classified into other classes. There ought to be given only one medal, or a few medals in each class, and honorable mentions as many as necessary, and not more; but in all cases the decisions of the jury ought to be supported by a more exact statement than has been generally adopted this year, where, in a great many classes for all medals, "excellence of quality," &c., &c., has been adopted. If many medals should be deemed desirable, then they ought to be of two classes, the first only of a very limited number. 6. An appeal against the decision of a jury ought to be allowed only in cases where it can be proved that the goods have not been examined by the jury, but in no other case. 8. Before another exhibition a law ought to be passed by which it is made a misdemeanour to exhibit in shops, or print in advertisements, on invoices, &c., "prize medals" of exhibitions which have not been obtained.

Frederick Edwards and Son, Exhibitors, Classes Xb. and XXXIa.—1. Yes. 2. Direct public judgment; objections to awards are rather against a system imperfectly worked than against the principle. 3. Would not exclude design. 4. Cannot suggest any more satisfactory method. 5. Their firm conviction that no exhibitor should be a juror in his own class. The few cases of abuse that have occured in the present Exhibition have arisen entirely from the deference that has been shown to such a juror by his fellow-jurors. Juries should be nominated and appointed in a similar manner to previous ones, and each exhibitor should be called upon to fill up a form, stating the reasons for his claim to excellence, and each exhibitor should be allowed to nominate a referee, some one having a knowledge of his particular branch of manufacture. The juries might then, from the various nominations for referees, be enabled to select whoever, and as many as they pleased, should they feel the want of any assistance with reference to any particular decision. 6. If a more perfect system in the working of juries can be carried out, the power of appeal is undesirable. 8. Express their hearty concurrence in the principle of giving one medal of degree, and publishing reasons for the awards; think this the most intelligent and just course that can be adopted towards the whole body of exhibitors.

Frederick Elkington, Juror, Class XXXIII.—1. Yes, but the three classes of awards. 2. His experience convinces him of the necessity of medals, but the difficulties of juries are increased by having only one medal to award. 3. Sculpture needs no awards. 4. As manufacturers are jurors, there should be jurors' medals, as without there is great difficulty in getting manufacturers to act as jurors. 6. Certainly not.

Elkington and Co., Exhibitors in Classes XXXIII. and XXXIX. — 1. Yes. 2. Bring meritorious works into notice, and act as incentives to rising houses. 3. Painting and sculpture should be excluded, but fine art in metal and designs should not be excluded. 4. There should be jurors' medals for jurors who are exhibitors, as without them there is a difficulty in getting practical men to act. 6. Decidedly not. 8. There should be three grades of medals. The present plan is not satisfactory either to jurors or exhibitors; the plan of 1851 much better.

George Ellis, Exhibitor, Class XIIa.—1. Yes. 2. Desired by exhibitors, and are incentives to exertion. 3. Should not be excluded, but awards should be made to the artist or designer, and not to the exhibitor. 4. Each class should elect its own "examiners," a better term than jurors, which implies that they are *sworn.* 5. Each class should have twelve examiners, nine a quorum, the majority to decide. Each board of examiners to have a clerk to attend all their meetings and record the proceedings. The names and number of the examiners in attendance on every occasion to be carefully entered, also the number of every article examined and decided upon, and how decided, whether by majority or otherwise. The records of the proceedings to be private till the couclusion of the examiners' labours, and then to be open to the inspection of all exhibitors. Exhibitors only to inspect the records of the classes in which they exhibit. At present there is no record of the opinions of the jury on each article. It is not known how the juries arrive at their decisions, nor does the public know anything of their regulations, if they have any. Such a secret mode of proceeding is by no means in accordance with the spirit of the age, and must be injurious to any cause wherein it is displayed. Thinks medals only desirable when judiciously and consistently employed, which he considers is not the case at the present time, when the same award is given for pickling an onion as for building a ship. Such absence of discrimination of the different grades of merit renders the award, in many instances, not only valueless, but ridiculous. Admits the difficulty of suggesting another system free from defects. If we had in England an order like the French Legion of Honour, and like that, too, conferable on highly distinguished merits, it would, probably, be regarded as a fitting reward for the eminent in science and art; and as it is possible that such an order may be created before another International Exhibition takes place, then an appropriate honour will be at the disposal of the Crown for those who may be recommended as worthy of it. For manufacturing skill, a suitable medal, similar to the present one, would be approved of. 6. None. 8. Exhibitors should be allowed season tickets at half the price charged to the public.

Messrs. Forster and Andrews, Exhibitors, Class XVI. —1. Yes. 2. Incentives to excellence. 4. Cannot suggest a better method. 5. Juries should be paid, to make them more responsible, and enable them to give proper time and attention in examining the respective exhibits. At least one member of the jury should be practically acquainted with the class of goods to be examined. In Class XVI. there

should have been an organ-builder to examine the mode of construction and planning of each instrument, as well as the quality of the workmanship. A professor of music is a proper person to give an opinion on tone, but not on construction; neither would a pianoforte-maker be capable any more than an organ builder would be suitable, to decide on the merits of the delicate portions of a pianoforte. 6. Yes, when it can be shown that they have passed over generally acknowledged excellencies; also if it can be shown that the awards made are incorrect, as in the case of organs. One exhibitor has a medal awarded for general excellence and light touch, whereas the pressure required to press down the keys when the whole of the stops are drawn, and the various manuals are coupled, is greater than three times the pressure required for the keys of these exhibitors (refers to printed letters for confirmation). Another exhibitor had a medal whose organ was not heard by the jurors, it being incomplete, and not playable till twelve days after the jury examined the organs.

W. C. Glen, Commissioner for Jamaica.—1. "Medals" not desirable; but exhibitors must be encouraged by the hope of a reward of some sort for the excellence of their articles. 2. Medals altogether unnecessary and undignified. 3. Authors of works of fine arts and designs as much entitled as others to awards. 4. If juries are properly selected, can suggest no better plan. 5. Mode of appointing jurors at the present Exhibition unobjectionable; but as regards their "proceedings," they should not be secret. Each section of jurors should form an open court. Exhibitors seeking distinction should themselves prefer their claims, specifying the goods and the special merits. Objections from exhibitors of similar articles should be heard. This, of course, subject to some limitation as to costs and otherwise, lest proceedings might be unduly protracted. 6. No. 7. It is not the proper function of the promoters of the Exhibition to bring meritorious productions to the notice of the public. When the jurors have made their awards in the manner suggested, those awards should be duly recorded and published in the official record of the Exhibition.

Henry Gregory (Gregory, Cubitt, and Co.), Exhibitor, Class XXVIIb. — 1. Yes; but juries and their proceedings must be improved; jurors must have correct knowledge, and see everything. 2. Exhibitors are at great toil and expense, and expect to receive some recognition, but a debateable question whether by medals or classified lists of names, like university honour lists. 3. Painting and statuary should be excluded; there is, as regards them, no sufficient universal standard of taste, and thus there can be no competition. Paintings and statuary remain as monuments of their authors' talent and genius. As regards designs for public buildings, bridges, &c., there should be some notice, as they are not preserved. 4. The public must admit that the jurors, upon the whole, have taken great pains and exercised much activity, thereby producing most valuable and well digested information, which, without some such process, would never have become generally known. Merchants and factors of London and other large cities of the kingdom, accustomed to constant mercantile pursuits, exercised daily in much traffic, interested both in buying and selling, and searching after the newest productions of manufacture, are, many of them, men possessing a high spirit of independence and self-respect, with, often, much sterling ability, and would exercise no thought but that which would be for the development of truth, the real advancement of knowledge, and the interest of the Exhibition in every way. 6. Competent juries can therefore be found; should be selected early, in order to obtain information as to their fitness, before final appointment. Suggests various details for improving procedure; a member of a firm here, and also of one in the colonies, who simply finds capital for the latter, being a juror, ought not to incapacitate the colonial house from receiving a medal, though in all other cases a juror, exhibitor, or member of firm exhibiting should be incapacitated, and the firm also, from receiving a medal in any class whatever, though honourable mention might be allowed. 6. The necessity of a court of appeal; never right that the jurors should be absolute; without court of appeal justice would fall short—justice to solid, undeniable claims and indisputable errors; for want of this there was absence of satisfaction to exhibitors. In cases where manifest error had been made from imperfect information, if corrected before the award had been made, it would have entirely changed the decision of the jurors. Instances of foreigners making use of English materials, and exhibiting them as proceeds of their own country, and Englishmen using French dyes, representing them as English, much misled the jurors, and caused them to make very different awards to what they would otherwise have done. A court of appeal would save commissioners from the frequent remark that it was an insult to all sense of right that no appeal could be made to correct inadvertent errors, caused by defects of information and judgment, whereby manifest wrong had been done to an exhibitor. As regards the award for a medal, the appeal should be confined to those exhibitors who could show a manifest error, the secretaries of the section having the power to reject or accept any appeal previous to its being brought before the Council. The secretaries of the juries would be very suitable men to form the courts of appeal, with any addition that the council of chairmen might think necessary. There are thirty-six classes; these might be again divided into three, appropriating twelve divisions to each twelve secretaries, as courts of appeal, with power to award the honour, of whatever nature it might be, subject to the confirmation of the council of chairmen. A court of appeal formed somewhat after this plan might be sufficient to answer all that was required, and satisfy every exhibitor. 7. Instead of an award by medals, would suggest the classification of the names of the exhibitors, as before stated; might consist of three classes, those now receiving a medal to be classed as No. 1, those obtaining honourable mention as No. 2, and all others to be included in No. 3; the names of the exhibitors classed in Nos. 2 and 3 to be placed alphabetically, but those classed in No. 1 to be arranged according to their degree of merit; the advantage of this system would show itself in several ways,—take, for instance, the case of three exhibitors, all deserving and receiving the honour of being placed in Class No. 1, from some acknowledged improvement in the articles they exhibited, yet they might differ much in degree of originality and perfection of design; the most perfect of the three would receive the more honourable distinction of being placed as senior in the list. At present there is no distinction, all receiving the same award, though differing much in point of merit; all other exhibitors would also share in some degree the notice of the public; at present those receiving no award are passed over. The propriety of allowing individuals to exhibit any article, not of their own production, may be a question of some consideration; freedom, however, having been given in this particular to the present exhibitors, would suggest the alteration that in the catalogue such articles should be particularly noticed as designed by Mr. A. B., of London, manufactured by Mr C., of Birmingham. From distant places an extension of time should be allowed for admission of the articles for exhibition, as many arrived too late for the inspection of the juries. Desirable, immediately after the first juries are dissolved, to form another jury from the secretaries of the section, to examine all foreign goods arriving too late, from long distances, and any cases omitted in the previous examination, rather than leaving it to the secretary to make these inspections entirely by himself, which was neither satisfactory to him nor fair towards the exhibitors.

Walter Hall (Wells and Hall), Exhibitors, Class XIII.—1. Yes, if any note is to be taken of superior excellence; and whatever course is taken to single out such cases, will amount to precisely the same thing. All the

difference there is between awarding a medal and reporting an exhibitor's merit, either by official document or any other means, is just that which exists between a Bank of England note and its value in gold. 2. By what other means are you to indicate onward progress and rescue deserving cases from the vast mass of productions which have no particular merit? If it be insisted upon that superior excellence, whether it be in novelty of design, exquisite workmanship, or what not, will always meet with due appreciation, I answer, that excellence is just as likely, nay, more likely, to be lost in a crowd, than if it were fated to waste its sweetness on the desert air. Assuming, however, that merit would meet with due appreciation thus left, and that the exhibitors who have thus shown surpassing excellence should be raised to the pinnacle of fame, as it were, by the public voice; yet, in another decade, what would be left to mark the position once occupied, since intervening years would obliterate the traces of a superiority recorded only on the shifting sand of public favour. On the other hand, if awards be made, of whatever description, you then endurably chronicle matter which ought not to go unrecorded. The rounds on the ladder of advancement are thus traced, and the starting points fixed from which, in years to come, may be measured the altitude attained. 3. Why not? Some think that Works of Art ought not to be admitted in International Exhibitions. We do right to admit them; but only half do it if we exclude them from the awards. 4. No; the method is English, and is therefore rooted in good soil. Know of no better method of trial than by jury. Like all other good things, it may be abused; but this is no argument against it. In choosing a jury, a due regard is had not to choose the friends or relatives of those exhibiting. No better method than the appointment of jurors for making awards can be suggested. 5. The jurors should be chosen by the exhibitors, and them only. The Commissioners have no right to meddle in the matter. 6. No; if the juries be rightly constituted, it will never be required except by people having an overweening estimation of their own productions, which may safely be taken to indicate a total lack of extraordinary merit; of course such people would never be satisfied unless the jurors acknowledged the fictitious standard to which they aspire. If, however, it should happen that the exhibitors of any class have not justice done them, through incompetence or any other shortcoming of the jurors, appeals even then should not be allowed, since the exhibitors having made their own choice, ought to abide by the decision, and thus gather wisdom from experience, and learn to be more discreet next time; indeed, if it were laid down as a law, not to be departed from, that appeals from the decision of the jurors would not be allowed, it would so influence the exhibitors in their selection, that it is more than probable no occasion would arise that would justify such appeal. Universal satisfaction cannot be expected, but if the system of jurors' awards would not meet the case, appeals from their decisions would not mend matters, therefore they should not be allowed, unless an extraordinary case should occur, in which the whole class should unanimously join in recommending a reconsideration thereof. 7. As before insisted on, whatever plan is adopted to signalise instances of superior skill and excellence, would be just tantamount to the award of a medal; the value of a medal as such, with its hieroglyphic to boot, might perhaps be represented by the lowest current coin of the realm, but as a mark of honourable and meritorious distinction, it is of great price and inestimable value to the recipient; so also would be any other means to the same end. Whether it would be of the most advantage to an exhibitor to receive a medal, have his name placed high in a eulogistic report, published officially, or be mentioned by the lips of eloquence before a countless multitude with a flourish of trumpets all are equally available for advertising purposes. 8. Yes; double your number of classes, rather than have articles heterogeneously intermingled, which are as distinct from each other as possible, however apparent the similarity may be. Look at Class XIII.: Electrical instruments and telegraph cables, &c., most assuredly should have formed a distinct and separate class, and not have been classed with philosophical instruments and processes depending on their use. How was it possible for these exhibitors to have justice done to them, seeing that our of seventeen jurors and experts, three only were at all acquainted with electrical and telegraphic matters, however efficient they may have been to grapple with the philosophical portion. Make it a condition that no exhibitor be eligible to serve as a juror, neither in his own class nor any other; it is an anomalous position for a man to hold, and must be inimical to that fairness and impartiality which should characterise all the proceedings.

Daniel Hanbury, F. L. S., Juror and Secretary, Class IIb.—1. I do not consider them desirable. 2. On account of the difficulty of making a fair and satisfactory award. This reason is, however, far more cogent in the case of some articles than of others. 7. It must be left to the public to judge of the merits of each production.

William Hawes, Vice-President and Member of the Council of the Society of Arts:—1. I think them undesirable; the experience of 1851, 1855, and 1862 proving the great difficulty of making awards fairly as between exhibitors, and justly as regards the public. 2. Because it is all but impossible to prevent errors in the adjudication of awards, which errors must cause great injury to exhibitors, mislead the public, and injure International Exhibitions in the estimation of exhibitors and the public, whose opinion cannot fail to be influenced by the statements of injured exhibitors. This liability to error arises from several causes:—(*a.*) From the constitution of juries, which precludes them as a body from having sufficient practical and technical knowledge of each of the great variety of subjects submitted to them, and which knowledge can alone enable them to decide justly upon the superiority of one manufacturer over others. (*b.*) From this deficiency of knowledge in the jury as a whole, throwing the practical decision of each award upon that portion of the jury (or it may be one juror only) which professes to have an accurate knowledge of all the conditions that determine the superiority of each article; as, for instance, the skill displayed in its manipulation, its cheapness, its superiority of quality, either at increased or decreased cost; the rapidity of production; the use of new materials, entirely or partially, to produce either a better, cheaper, or more saleable commodity; its fitness for particular climates or markets, and whether the article exhibited is a mere "tour de force" produced without reference to the cost of the materials, the labour bestowed upon it, or the commercial demand for it. (*c.*) From such knowledge, partially or wholly, being possessed by jurors only, who are or have been engaged in the manufacture or production of the article under inspection, whereby, and very probably, the lesser knowledge and enterprise of a rival becomes the standard to test superior knowledge, skill in manipulation and invention, or the knowledge of a retired manufacturer becomes the standard by which improvements in principle or practice, which in his time were never thought of, are to be valued. (*d.*) Besides these sources of error, there are those caused by accidental omissions and by defective judgment, and also those most difficult to deal with, arising from personal feelings and interests, which lead either to a wrong adjudication or to the omission of entire classes, on account of the injury which giving medals of superiority to one would cause to friends of jurors, or even to jurors themselves. 3. Yes, because the difficulty of adjudication is greater than in respect of manufactures and other products. The superiority of one work of Fine Art or design over another will often depend upon qualities which are not capable of exact expression, and respecting which equally good judges, whether artists or amateurs, may most honestly differ. 4. Objecting to the system of awards for merit, I need not notice it. 5. I think juries

should report on actual and relative progress only, and not reward. This would, I think, make their reports more interesting and useful to the public, and would secure as jurors the services of many practical men, who are now excluded on account of their being exhibitors competing for prizes. 6. If juries be entrusted with the duty of making awards, then I think their decisions ought to be supervised by an independent (perhaps a paid) body before publication; but I do not think an appeal after publication ought to be allowed. Too much care cannot be taken to secure correct adjudication. A reward given or withheld unduly, whether from accidental omission, error of judgment, want of knowledge, rival interests affecting the decision, or any other cause, misleads the public, and is a serious injury to every other producer of the same article, whether exhibitor or not. 7. The newspapers, daily and weekly, conducted as they now are, afford the public every possible information as to the relative merits of the articles exhibited, and place each exhibitor in his proper relative position. I would call attention particularly to the series of articles now appearing in the *Times*. In 1851 progressive prizes were considered necessary. In 1862 but one prize and an honourable mention is allowed to be sufficient for the object in view, and I believe in another ten years, if the prize system be abolished, the desire to obtain favourable notices in the periodical press, written as they will then be under a deeper sense of responsibility than now, when prizes are given, will be a sufficient stimulus to manufacturers and producers to exhibit, and will be considered by them and the public as a safer index of merit than the award of a prize by a jury. I believe, also, that while prizes stimulate one class of exhibitors, who will resort to every possible means to obtain them, they discourage and injure those who rely solely on the intrinsic merit of the articles they exhibit being appreciated by the jury. The fact of the award of a prize, by a jury appointed by the Royal Commissioners, may be circulated all over the world, but that it was made on account of the most trifling superiority over other exhibitors, or by a vote of a very small majority of the jury, cannot be known; yet the award of the prize stands forward as a natural declaration of superiority. Whether this be just to other exhibitors, or to the public, is a point on which I have no doubt. On the other hand, the criticisms in the public press point out the special and comparative merits of all articles exhibited. Praise is meted out for one point of excellence for one exhibitor, and for another point to another in the same description of manufacture or produce; and the merchant, the dealer, and the public, are left to decide on the practical and commercial value of each as a whole, without being unduly influenced by the conclusions of a jury, which, whether right or wrong, or partially right and partially wrong, give to every article rewarded an artifical value, and enables a prize-holder to obtain an undue advantage over his rivals; further, the award of a prize offers no security to the public that the articles sold under the same description are of equal value to those for which the prize was given. The award then becomes, in the hands of many, a means of misleading the public, inducing it to rely on the judgment of a publicly-appointed though irresponsible body, instead of forming by careful examination an opinion of its own. 8. The opinions I have expressed are given without having a clear estimate in my mind of the value of the prize system as an inducement to manufacturers and others to exhibit. Upon this part of the subject I wish to speak cautiously. In considering it we ought to inquire what is the object of an International Exhibition, and what is the object of prizes to the exhibitors. The object of an International Exhibition is not to reward exhibitors, but, by obtaining great collections of industry and art at certain recurring periods, to mark the progress, and to stimulate the industrial energies of the world, and to afford information as to the suitability of each country to supply certain products, natural or artificial, at the lowest rates, and of the best quality, whereby the waste of industry in producing similar articles in less favourable situations may be avoided. The object of giving prizes is to offer an inducement to all classes of producers, by the commercial advantages which attach to the notoriety of being prize-holders, to send articles to the Exhibition. If without prizes an Exhibition could not be held, nothing more need be said; and all we can do is to make the distribution as fair and honest as possible, confining it strictly to inventors, designers, manufacturers, and producers. But, giving the best consideration in my power to the subject, I believe that when the next Exhibition is held, the prospect of obtaining favourable notices and criticisms in our periodical press, and in the reports of the juries, will secure an ample representation of the progress of art and industry.

J. Harrison and Sons, Exhibitors, Class VIIa.—1. No. 2. The public the best judges, and the best able to give an adequate reward. 3. If there are any awards, they ought not to be excluded. 4. If any award made, the appointment of jurors, rightly made, the best method. 5. No one, directly or indirectly engaged in the trade of the class whereon he is sought as a juror, ought to be selected. Trade jealousy and prejudice is apt to creep in, and has, in our opinion, been apparent in many awards and omissions of award. The awards of the jurors ought to be made public before they (the jurors) are finally dismissed, so as to give an opportunity for re-adjudication, where necessary. 6. Most decidedly; otherwise great injustice may be and has been done. 7. The mere exhibition of meritorious productions, and the usual common-sense methods, whereby any article of usefulness is brought to public notice, are quite sufficient. 8. No.

Alexander Harvey, Juror, Class XXIII.—1. No. 2. Because, from my experience as a Juror both in 1851 and during the present year, I have found that the awards of juries, however honestly made, have given rise to a great amount of dissatisfaction and jealousy among exhibitors. 3. Yes, particularly works of fine art, as it is often the case that deserving and obscure merit is pushed aside to make way for a name which may be already famous, thus giving rise to discontent and jealousy. As to works of design, if awards are to be given, they are less liable to the above objection. 4. No. 5. No. 6. If any mistake or oversight has been made in the decision of a jury, a recommendation might be made for a reconsideration of the subject by the particular jury; but I could not recommend an appeal to any other quarter, not even to the chairmen of juries. 7. Does not think awards desirable, but would leave the decision of the merits of articles exhibited to the public. 8. Has no suggestion to offer on this head, but would express an opinion that any Exhibition of a similar nature as the present now open, if got up during the present generation, would not be successful; reasons for thinking so are that, on all hands, he has found dissatisfaction among exhibitors, who have not been noticed by the juries, after they have caused themselves a great amount of trouble and expense in preparing for the Exhibition; also the parsimonious treatment they have, in many instances, received from the Commissioners; does not think that the same parties would again exhibit, but would, most likely, do all in their power to persuade others not to exhibit.

Samuel Highley, Exhibitor in Classes XIII., XIV., and XXIX.—1. Yes, by medals, for ingenuity, novelty of design, for excellence of workmanship, and for cheapness combined with good workmanship. One bronze class medal to be awarded, for one or all of these reasons, to every exhibitor whose contributions may be worthy of recognition. [By *class* medal is meant a medal bearing an inscription indicating the class of objects for which it was awarded. For obvious reasons every medal ought to be engraved with the name of the exhibitor to whom it was awarded.] 2. Without award of medals exhibitions would degenerate into mere bazaars and advertising mediums, for tradesmen would think such occasions advantageous for bringing their names and wares before the public; but

there would be no special inducement for them to enter into greater expenses than such a feeling indicated as necessary for that purpose; and, as a rule, their ordinary wares would meet the requirement of the moment; but if, on the other hand, there was a chance of attaining distinction by the recognition of a medal, then there would be an inducement to tax both brain and pocket to produce novelties and bring forth inventions. The recognition of merit by a medal is of the greatest value and encouragement to young and ambitious houses. 4. No; if men are selected who are free from trade interests or known prejudices, and who are willing to sign a declaration that they will fulfil the duties expected of those who accept the honours of jurors. 5. *a.* The arrangements for the election of jurors were, on the present occasion, very imperfect, for as every exhibitor was requested to name three such persons as might suggest themselves, it was hardly to be expected that there would be such an unanimity of opinion as to secure the election of those best suited for the duties of jurors. The voice of the exhibitors must have had very little weight in the selection of those appointed by the Royal Commissioners. A better plan would be for the sub-committees of classes and sub-classes (formed of exhibitors), to give in a list (of? number of names) of those whom they considered most fitted to fulfil the important duties of jurors, and whom they had ascertained were willing to serve. These lists should then be printed, and a copy sent to every exhibitor in each class, with a request that he should select a fixed number, and indicate the names of those that are individually considered most fitted for the class. The election of jurors would then be entirely and really (as it ought to be) in the hands of each trade, the chairman of juries alone being elected by the Royal Commissioners. *b.* More time ought to be allowed for the juries to make their examination of the contents of the Exhibition than was given on the present occasion. *c.* The jurors ought to examine the contributions of every exhibitor, or formally enter upon the minutes of their proceedings the reason why such an examination could not be made. *d.* Facilities should be provided for testing the character of the articles submitted to the judgment of the juries, for it should not be taken for granted that because articles are produced by old established or celebrated houses, that articles said to be improvements are necessarily so; on the other hand, it must be of the greatest satisfaction to all conscientious producers, that the favourable opinions of a jury are founded on absolute experience by putting their contributions to a proper test as to their value. *e.* The secretaries of juries should be paid officers, for on the present occasion many gentlemen did not completely fulfil their honorary duties. 6. *a.* Decidedly; especially if the jurors have omitted properly to examine or test the contributions of an exhibitor. *b.* On the other hand, against an award to any exhibitor who can be proved to have received an award for an article or articles he has neither designed nor manufactured. 8. *a.* That these Exhibition medals should rank as the insignia of a civil "Order of Merit." *b.* That if this suggestion were carried out, it would cause the jurors to exercise excessive care in making their awards, and make a medal of value and importance. *c.* That the mere advertising spirit ought in every way to be discouraged by all officers of the Exhibition, which was far from being the case on the present occasion. *d.* That the honorary services of those jurors who have conscientiously fulfilled their duties (to be tested by a certain number of attendances), should be acknowledged by a silver "Juror's (Class) Medal."

(*To be continued.*)

SANFORD AND MALLORY'S PATENT FIBRE AND FLAX SCUTCHING MACHINES.

Fibre Machines.

This machine, which is intended for extracting the fibres from the leaves and stalks of fibre-bearing plants whilst in the green state, was shown in the machinery department of the International Exhibition. The importance of this invention will be recognised by all who are conversant with the methods now in use for extracting fibres from the plants containing them. The processes at present generally in use in the countries where the fibres are grown are of the most primitive and rude description; pounding with a mallet, scraping with a sharp stick, ox rib bone, or piece of hoop iron, and washing in water, are the laborious means by which a few pounds of such fibre as Sisal Hemp or the Pine Apple, are extracted per day. Tropical countries abound in plants containing very valuable fibres suitable for textile purposes, and which would be largely used in manufactures, were some simple method known of cheaply and expeditiously bringing them into a mercantile condition. This method the inventors believe they have found. It has been ascertained that the fibres of all plants are naturally white whilst the plants are in a green or growing state, and only become discoloured by dessication or decay, and being exposed to the action of the atmosphere after being cut, the juices and gums which envelope the fibres then undergoing a chemical action, whereby they become fixed in the fibres, rendering them discoloured and hard, and consequently a bleaching and softening process is necessary before they can be advantageously employed in manufactures. These juices and gums are soluble in cold water whilst the plants are in a green state; and if the leaves or stalks are then subjected to a combing and hackling process in combination with the use of water, the extraneous matters will be washed away, and fibres produced of full strength, white colour, and soft; this last is a most important point to the manufacturer, and depending not so much upon the nature of the plant (as supposed) as upon the amount of *gum* left in the fibre during the extracting process, which gum renders many very valuable fibres harsh and brittle, and difficult to use for textile purposes. The machine consists of a frame-work, about 4 feet square, carrying a cylinder covered with an elastic substance, such as vulcanised rubber, and armed transversely with teeth and scrapers of certain construction, adapted to the plant to be worked. This cylinder, for about one-half of its circumference, runs in contact with, and drives an endless elastic belt, armed precisely as the cylinder, with similarly shaped teeth and scrapers, and capable, by means of adjusting screws, of being made to bear with more or less pressure against the cylinder. There is a pair of feed rollers, one elastic and the other of corrugated metal, which move at a slower speed than the cylinder and belt, and hold the leaves, stalks, or fibres firmly, whilst feeding them in slowly to the more rapidly-moving cylinder and belt, the result being a combing and scraping motion, which eventually loosens and removes the extraneous matters. The feed rollers have a reverse motion, and when about one-half the length of the leaves or stalks is fed in, the reverse motion is put in action by the foot or hand of the operator, the cleansed portion withdrawn, and the other end presented and operated on in like manner. During the operation, a stream of water is allowed to flow over the cylinder and belt, and through the fibres, effectually dissolving and washing away the gums and juices, and preventing the atmosphere from acting on the same, and giving, as the result of the process, white, soft, and even fibres. It is stated that the machine can be worked by one person, with the help of one or two children to hand him the leaves or stalks, and remove the fibres as cleaned; that it requires less than one horse power to drive; and where steady steam or water-power is not available, a portable horse-power is the best. These have been fitted to several of the machines, to go to India. The portable horse-powers possess the advantage of being easily moved from place to place with the machine, which weighs only 9 cwt. The teeth and scrapers are so fastened as to be easily removed and replaced by others of different formation, so as to adapt the machine to work

any kind of plant. The machine will clean all Endogenous plants, such as the *Agave*, *Bromelia*, or Pine Apple, *Musa*, or Plantain, and *Phormium tenax*, or New Zealand Flax; also the different varieties of the Sanseveria, which produce valuable fibres. It will also clean many of the Exogens, such as Hemp, Rhea or China Grass, Jute, Sunn Hemp, &c. Mr. E. G. Squier, in his work on Tropical Fibres, says that the work of a native Yucatan is about six pounds of Sisal hemp per day. In Spain a man's work is six to eight leaves of the *Agave Americana* per day, producing about half as many pounds of fibre. The inventors state that this machine will run twelve to fifteen hundred averaged sized Agave leaves per day. In the Phillipines the produce of a man's labour in Manilla hemp, extracted from the *Musa textilis*, is about 24lbs.; the machine will give about ten times that quantity. It will clean six to eight thousand leaves of the Pine Apple, and about as many of the *Phormium tenax*, per day. Where the leaves are so thick as not to be easily passed through the feed-rollers, they require to be crushed to the requisite thinness. For this purpose a peculiar description of roller has been designed, whereby the leaves, besides being crushed, are divided into strips lengthways, thus facilitating the operation of the machine, and increasing the quantity worked per day. The patentees are now building machines of a larger size than the one shown in the International Exhibition, suited to produce fibres seven feet in length. The diameter of the cylinder is 30 inches, and the width of feed 16 inches; weight about 9 cwt.; speed required, 80 to 90 revolutions per minute.

FLAX SCUTCHING MACHINE.

Messrs. Sanford and Mallory have also introduced a flax scutching machine on the same principle as the fibre machine. The cylinder is about 20 inches diameter, and the feed 26 inches. The principle upon which it works is this:—The flax-straw, in a thin stratum, is passed through a pair of feeding-rollers, one of which is elastic, the rollers allowing the straw to pass through them at the rate of one hundred and sixty feet per minute. As it passes through the feed rollers it comes in contact with a cylinder and belt, which are running (one driving the other) at the rate of eight hundred feet per minute; the belt and cylinder being armed with teeth and scrapers, and arranged so that the straw must pass between them, the bars or scrapers and teeth taking hold of the flax-straw upon both sides of the straw, the set of bars upon the belt striking the straw on one side about one-eighth of an inch in advance of the bar on the cylinder, breaking the woody part of the straw very short, while the teeth on both cylinder and belt keep the fibres perfectly straight, so that most of the woody particles drop through the bars or scrapers on the belt (the belt being open for that purpose), the remaining *shooves* are scraped off and carried out of the fibre at the end of the machine, through channels which the teeth keep constantly open. The construction of the machine is such that the flax-straw upon being fed in is first bent one way and then the other. The first effect of this bending motion is to relieve the fibre from the *boon* longitudinally, the next effect is to break it, but not until after the bars have first loosened it. This action avoids the possibility of injuring the fibre by the teeth and scrapers in removing the *boon* or *shoove*. To work this machine, one person (a boy or girl may do it) places the flax-straw in a clamp about two and a half feet long, and an inch wide by one-half inch thick, the inner surface being lined with rubber, so as to yield to the unevenness of the straw as it is laid in it. The clamp is jointed at one end like the ordinary "newspaper holder," and is very like it in appearance. Each clamp, filled with the straw, is laid upon a table near the machine, and is then taken by another person (boy or girl), who presents it to the feed rollers, holding one end of the clamp until the rollers have drawn the straw in; after the straw has been drawn a little more than half its length, the operator then steps upon a *treddle*, which reverses the motion of the feed rollers (the feed rollers being so arranged that they feed the flax *out* five times as fast as it was fed *in*). The operator then presents the other end of the straw held in the clamp, which is fed in as before. The product, after undergoing this operation, is in a fit state to spin into all goods of a coarse character, such as twine, towelling, &c., &c., but for fine goods, as with flax fibre dressed by all other modes, it has to pass through a subsequent hackling process, but with this remarkable difference: The fibres cleaned by this machine being all unbroken and uninjured, and each fibre being perfectly parallel with every other fibre, and being free from *boon*, the hackling process is attended with very little waste. The power required to drive is about half a horse power. The speed requires to be varied according to the degree of retting the straw has received. For ordinary retted straw about 150 revolutions per minute are sufficient; for more tender and over-retted, 125 will suffice; and by means of spare pinions the motion of the feed-rollers can be increased or diminished so as to give less or more work, according to the nature of the straw to be cleaned. The amount of flax fibre produced in the United States in the year 1850 was 7,806,809 pounds. Had the straw from which this amount of fibre was taken been dressed by this machine, the yield would have been, according to the calculation of the inventor, not less than 10,409,078 pounds. The increased product or the flax saved, at present prices, would be worth 312,271 86 dollars. It is well known that flax can be successfully cultivated in all the Northern States. If in addition to the value of the seed—sufficient of itself to pay the entire cost of cultivation—the straw can be made a source of large profit, a wide field of successful industry will be opened.

Flax-dressing by the hand process is so tedious, and the daily yield so small, as to render it unprofitable to the farmer; and as few farmers have sufficient capital to enable them to erect suitable buildings, and to purchase the expensive machinery now in use for flax-dressing, they are compelled, if they raise flax at all, to sell the straw to the mill owner. Farmers living at a distance from a mill cannot afford to cart the straw to it; hence, the amount of flax dressed is limited, and the price high. Had every farmer a machine which could be driven by horse power, and be attended by boys or girls, without risk to the operatives, it would not be long before a linen fabric could be purchased for a price less even than that of cotton. Great efforts have been made in this country, as well as in Europe, to devise such a machine, but hitherto without success. Mr. Sanford considers that the machine invented by him, which we shall presently explain, will fully answer that important end.

Home Correspondence.

MR. HUNT'S PAPER ON MINES.

SIR,—All subjects that do not admit of demonstration must be deemed hypothetical. However, in our theories, we must be governed by the knowledge which science has revealed. The laws of nature are eternal—they admit of no mutability. Man's interpretation of a law of nature may be erroneous, but never the law itself. Geological science has demonstrated—beyond all cavil or dispute—that there are two great series of rocks covering the earth's surface: the first called igneous or primitive, the second sedimentary or aqueous. The proofs of the primary being igneous consist in their being non-stratified, compact, and chrystalline, which could not have arisen from any other condition than that of intense heat; whereas the secondary indicate that they are the result of disintegration of the primitive by the action of water, laying on it in layers or stratifications. It necessarily follows that, if at a remote period of the earth's existence it was in a liquid molten state, that at a still much more remote period it must have been in the condition of a

dense gas or vapour. During this free or gaseous state, all the materials arranged themselves in accordance with their specific gravities. This is the reason why the denser metals, as gold, platinum, and iridium, are so scarce in proportion to those of lesser density, such as iron, copper, lead, &c.

Geogonic measurements indicate that the earth is a spheroid, flattened at the poles in the direction of the axis of rotation. This modelling would take place on any fluid mass subject to a rotary motion. Radiation for vast periods would cause it to cool.

It is estimated from the gradual increase of heat experienced as we descend into the earth, that at a depth of less than 30 miles the heat would be over 3,000° Fahr.

During the period of the consolidation of the primitive rocks, most of those substances which enter into the secondary or stratified rocks, with elements of the water which constitutes the ocean, were in a gaseous state. As the cooling advanced these were condensed on the surface—water covered the face of the earth.

Antecedent to this period numerous convulsions and upheavings had taken place, consequent on the contraction of the material forming the crust of the earth. It was at this period that the first fissures, rents, veins, or lodes, were formed. It was not, however, until the deposit of the secondary rocks, that those gigantic quartz veins were formed. The contractions at this period must have exerted enormous force on the interior molten mass, which caused the fissures, lodes, or veins, to be filled with a heterogeneous mass, some in a native state, as gold, or alloyed with silver, platinum, iridium, palladium, &c. Most, however, have combined with sulphur as sulphides, as silver, lead, mercury, copper, iron; others, as silicates or carbonates, &c., &c.

Mineral veins present no uniformity, sometimes for hundreds of yards of from 20 to 50 feet in width—these suddenly contracting, so that the walls of the lode are in contact with each other. This may continue for any extent, for the direction of the lode may be lost altogether, or may as suddenly reappear after cutting through "the horse," as this contact is called by miners. It will be perceived that the deviation, size, and all other conditions appertaining to veins or lodes have been determined by mechanical force, consequent on the numerous catastrophies which have accompanied the earth's transition from the fluid to the solid state.

The splitting of the globe, subsequent to the first strata, has been in a different direction. This has caused the nonconformity between the two strata, and should this re-occur, the same deviation would exist. All veins may be divided into three classes. 1st. Those of purely igneous origin. 2nd. Those of a mixed igneous and aqueous. 3rd. Those purely aqueous. It is impossible for any one who has practically attended to the working of a mine not to come to the conclusion that the substances which compose the lode were not forced up in the most heterogeneous manner. The sulphides of silver and lead, 100 or 1000 feet, then large deposits of native silver, then lead, or even gold, copper, antimony, bismuth, &c. How could sulphur have combined with metals like iron, copper, mercury, lead, antimony, &c., in the form in which it is plentifully formed in nature if fire had not been the active agent to produce these sulphides?

I have examined many of the principal mines of Mexico, Chili, Peru, New Granada, and California. One remarkable deposit of gold in the latter country was at Carson's-hill, which is the highest point by some 3,000 feet than the surrounding country, where about £300,000 worth of gold was extracted in the space of about 50 feet of the quartz vein, which was about 16 to 18 feet in width. The lode below this "pocket" or "bunch" of gold was without a particle of the precious metal. In this case the deposition must have been purely igneous. On the contrary, in Mexico, I saw a magnificent cluster of quartz crystals, permeated and interlaced with threads of native silver. Here was the conjoint action of fire and water. In the case of the carbonates of zinc, lime, &c., there must have been the action of water.

From the foregoing remarks it must be evident no amount of scientific education could enable the miner to predict the character of a lode, or the value of a mineral deposit. If the structure of veins were regular, or their contents not of the most dissimilar character, then we might be able to arrive at correct data. As it is, we must be content to delve, and with that experience alone must we rest content. No doubt a scientific education will enhance the position of the miner, as it does all other vocations. Practice alone gives a certain knowledge, which is essential to success. No class of men—at least so far as my experience warrants me in forming a conclusion—are more able than the English miners; each is an adept in his own particular speciality. The copper or tin miner of Cornwall will not be conversant with a coal mine, nor the collier with the indications of a rich deposit of lead.

My desire has been to concentrate, in the most succinct form, ideas relative to the origin and formation of metallic veins. If I have failed to do so, my apology must be that the subject, from its very nature, is one which would require more space than you would be able to place at my disposal. I am, &c.,

ROBT. H. COLLYER, M.D., F.C.S., &c., &c.

Beta-house, 8, Alpha-road, N.W., Dec. 22.

MR. TAYLOR'S PAPER ON LABOURERS' COTTAGES.

Sir,—Having been present at the meeting of the Society of Arts when the above paper was read, and being much interested in the subject, and I may say gratified by the new light thrown upon it by Mr. Taylor, I venture to hope you will allow me a few lines to reply to some portions of Mr. Reveley's letter, which appeared in the succeeding number of your *Journal.*

I cannot see that it was the sole aim of Mr. Taylor to impress the meeting with an idea that "none but patented articles should be used in building cottages," but rather to show that the manner of applying the materials now in use is faulty, and not the materials themselves, and that by proper adaptation the same materials may be available in a much improved form, for, you will observe throughout, that no new substance is in any case proposed in lieu of those which have been in use for centuries.

Mr. Reveley speaks of the abandonment of bricks and mortar. It is difficult to imagine how Mr. Reveley could have listened to Mr. Taylor's paper and have fallen into such an error, when the whole of the proposed walls were to be constructed either wholly of bricks, or faced with brick backed by concrete, though, when combined with the latter material, the facing bricks were shown of an improved form for the purpose, and this latter combination Mr. Taylor has shown will make a good and substantial wall more economical than the ordinary brick wall, which, in building a cottage, where every penny is an object, is certainly a point gained. This form of brick, besides being lighter, less costly, and of better appearance, having a face equal to stock brick, is so burnt in blocks, as to produce six bricks, and can be handled more readily, and packed in less space, than ordinary bricks, and can be applied with concrete where bricks could not be sent on account of the cost of carriage, as in this case, only sufficient would be required for facing the walls, whereas, in the other, the whole of the thickness of the wall would require to be built solid.

This cannot be called an abandonment of brickwork, but an improved application of the old material.

I think the great merit of Mr. Taylor's paper lies in showing how existing evils may be overcome. Take, for instance, our cottage paving tile, good in itself, but made unbearable by the manner in which it is laid upon the ground, by the introduction of air beneath; in a simple

way it is made a good, dry, clean, and suitable paving for cottage floors.

That portion of Mr. Reveley's letter referring to ground rents, &c., is not a part of the subject that Mr. Taylor proposed to solve, or could be expected to touch upon under the title of his paper. It would be no cheaper to build a cottage upon a piece of freehold than household land.

Mr. Reveley goes on to state, that it is well known that the "worst bricks and poor lime" are the rule for labourers' cottages, for which reason everyone ought to foster any suggestion likely to prove beneficial, and as Mr. Taylor cannot, I presume, alter the laws so much complained of, which at present exist, the only course open to him is to avail himself of the protection offered him, and patent any improvement he may make so as to secure it against piracy.

Anyone of experience will tell you how a building is likely to turn out if left to the builder alone, and the greater portion of the buildings of which Mr. Reveley complains are so erected, and surely there can be no worse way of going to work (I speak here of the principle) than by allowing exclusively an interested party to carry out the work. Take, for example, any of our churches which have been rebuilt (and disfigured) by the churchwardens, as is usually set forth upon a panel in front of the gallery or other conspicuous place, these men being commonly the builders and authorities of taste in the village, and you have a very fair sample of how work is done by builders in their own way.

Palatial residences for the poor find but little sympathy from Mr. Taylor, as he distinctly said in his paper, "I would prefer to give the labourer a little more than he already has, than strive to make a model labourer or model home."

With the colonising idea, I quite agree with Mr. Reveley, but any one must see the very great difficulties to be overcome to arrive at this end, especially near London. It is very easy to plan out a grand scheme, which would be all that we could desire, and quite a different thing to remedy the existing evils, which should first be done, as a stepping-stone to that which looms but very indistinctly in the distance.

The two-story cottage is all very well for this miniature Canada, but, in the thick of a London slime, it is far better to live as high up above it as we can than be always on a level with and in the midst of it, and, notwithstanding the "waste of human strength" expended in the operation, I cannot agree with Mr. Reveley that the model lodging-houses, or buildings of many storys, are at all inapplicable for large towns and cities, where the ground is not to be had, or, if obtainable, at enormous outlay. The labourer must live within reach of his work.

I am, &c.,

J. W. HALLAM.

Proceedings of Institutions.

Dudley Mechanics' Institution.—A short time since, the foundation stone of the new Mechanics'. Institution building was laid by the Earl of Dudley, supported by the leading noblemen and gentry of the town and neighbourhood. The friends of the Institute, which has now been in existence about 15 years, have long felt the urgent necessity of erecting suitable premises for the accommodation of the various departments of a really efficient Institute, and have been making great exertions for some years past to raise a fund for the purpose. They are now in a fair way of seeing their expectations realised, for they have already sufficient money to enable them to put up the most useful portion of the proposed building, and have received liberal promises of further help. The building is in the Italian palatial style, and will comprise two reading-rooms, library, museum, school-room, class-room, laboratory, public hall for lectures, exchange, &c., and librarian's apartments. On the occasion of laying the corner stone (the building is nearly half erected), a procession was formed to the site, and the ceremony was performed by the noble Earl, in the usual manner. The address, which was presented by the secretary, alluded to the warm interest which his lordship had taken in educational works in the district, and gave a concise account of the past history of the Institute. Allusion was also made to the proposed operations of the society, particularly to the establishment of a trade and mining school worthy of the rich manufacturing and mining district lying round the town. The Earl, in his speech, expressed his interest in the welfare of the Institute, and spoke in general terms of the many advantages which the new Institute is calculated to confer on the town, both as an architectural and educational feature, and concluded by expressing his intention of assisting in the erection of the public hall, which forms so important a feature in the plans. Lord Lyttelton also expressed his sympathy with the movement which that day's proceedings were likely to encourage, and, after alluding to his connection with Dudley, congratulated the town on the prospects of an educational Institution suitable to so populous a centre. In the evening a conversazione and scientific exhibition was held, under the presidency of Lord Lyttleton, when gentlemen from the district gave addresses on subjects connected with the objects of the meeting. A valuable collection of Silurian and other fossils, natural history specimens from the locality, scientific apparatus, diagrams, &c., formed a varied and instructive display, and the day's proceedings throughout were of a most gratifying character.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Geological, 6½. Anniversary meeting for the election of officers; after which, Mr. C. Carter Blake will read a paper on the "Fossil Animals of South America."
Medical, 8½. Mr. Hancock, "On the Superiority of Chophart's operation, and Excision of the Ankle, over any other method, in all cases admitting of their performance."

Tues. ...Pathological, 8. Annual General Meeting.
Royal Institution, 3. Prof. Frankland, F.R.S., "On Air and Water." (Juvenile Lectures.)
Photographic, 8. Mr. Samuel Highley, F.G.S., "Photography in its Application to the Magic Lantern Educationally Considered."
Ethnological, 8.

Wed. ...Geological, 8. 1. Mr. T. Davidson, F.R.S., "On the Lower Carboniferous Brachiopoda of Nova Scotia." 2. Mr. T. Curley, "On the Gravel-deposits of Ludlow, Hereford, and Skipton." 3. Messrs. George E. Roberts and John Randall, "On the Northerly Extension of the Upper Silurian Passage-beds of Lindley, Salop.' Communicated by the President. 4. Mr. George E. Roberts, "On some Crustacean-tracks from the Old Red Sandstone near Ludlow." Communicated by the President.
Pharmaceutical, 8.
R. Soc. Literature, 8½.

Thurs...Royal, 8½.
Antiquaries, 8½.
R. Soc. Club, 6.
Royal Inst., 3. Professor Frankland, F.R.S., "On Air and Water." (Juvenile Lectures.)

Fri. ......Astronomical, 8.
Archæological Inst., 9.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, December 19th*, 1862.]

3288. C. Sanderson, Sheffield—An improved mode of manufacturing bands for driving machinery, lifting weights, and other analogous purposes.

3290. J. Hilliar, Balsall Heath, Worcestershire—Imp. in hinges, joints, or connections, and in applying them, parts of which improvements may also be employed for constructive and decorative purposes.

Dated 9th December, 1862.

3296. V. Mirland, Frameries, Belgium—Imp. in manufacturing paste from the dried pulp of rhubarb to be used as preserve.

3298. W. Clark, 53, Chancery-lane—Imp. in photographic apparatus. (A com.)

3303. G. Jeffries, Golden Ball-street, Norwich—Imp. in breech-loading fire-arms.

3304. W. E. Newton, 66, Chancery-lane—Imp. in fire-arms. (A com.)

Dated 10th December, 1862.

3310. S. B. Whitfield, Birmingham—Imp in the dovetail joints used in metallic bedsteads and other articles of like manufacture.
3314. W. A. Turner, Lawrence Pountney-lane—Imp. in machinery for cutting or paring starch.

Dated 11th December, 1862.

3320. J. R. Breckon, Darlington, and T. Douglas, Crook, Durham—Imp. in the manufacture of fire bricks and other articles usually made of fire clay.
3332. R. Clark, Langloan, Lanark, N.B.—Imp. in machinery or apparatus for boring, winding, and lifting for mining purposes.
3324. J. Imray, 65, Bridge-road, Lambeth—Imp. in apparatus used for mixing and kneading.
3326. T. E. Vickers, Sheffield—Imp. in the construction of ordnance.

[*From Gazette, December 26th*, 1862.]

Dated 1st September, 1862.

2419. J. Watt, 13, Graham-street, Walworth, Surrey, and T. S. Haviside, 69, Cornhill—An improved method of treating flax and other similar vegetable fibrous substances to be used as substitutes for cotton.

Dated 3rd September, 1862.

2436. F. C. Bakewell, 6, Haverstock-terrace, Hampstead—Imp. in fire-places and stoves. (A com.)

Dated 4th September, 1862.

2447. J. Platt and W. Richardson, Oldham—Imp. applicable to the burning of bricks, tiles, and other articles of earthenware.
2450. J. Platt and W. Richardson, Oldham—Imp. in the preparation of clay for the manufacture of bricks, tiles, and other articles which may be made of such material.

Dated 15th October, 1862.

2777. W. Wilson, 18A, Wigmore-street—An improved oblong drawing room bagatelle and billiard table, with reversible top, and made in various shapes and sizes.

Dated 16th October, 1862.

2791. G. Berry, 19, Buttesland-street, Hoxton—Imp. in locks.

Dated 25th October, 1862.

2874. Lieut. G. T. Key, R.N., Portsmouth—Imp. in fog and other signals.

Dated 27th October, 1862.

2893. G. Lindemann, Salford—Imp. in the manufacture of bricks, tiles, slabs, and other articles of earthenware or other plastic material, and in the machinery or apparatus connected therewith.

Dated 31st October, 1862.

2947. H. Williams and J. Maxton, Broadway, Nottingham—Imp. in machinery or apparatus employed in the manufacture of lace or trimmings made on bobbin net or twist lace machines.

Dated 3rd November, 1862.

2969. W. Clark, 53, Chancery-lane—Imp. in castors, and in the manufacture of the same. (A com.)

Dated 19th November, 1862.

3105. J. Chalmers, 8, Knight's-place, Vauxhall—Imp. in the use, combination, and application of iron and timber as armour for vessels of war and fortifications.

Dated 24th November, 1862.

3151. R. Hawthorn and W. Hawthorn, Newcastle-on-Tyne—Imp. in pump valves.

Dated 27th November, 1862.

3176. J. Halford, Great Barr, Staffordshire—Imp. in the preparation and treatment of small coal or slack, whereby a certain carbonaceous product is obtained and rendered available for use in the maufacture of iron and steel, in the process of casting and moulding metals, and in the manufacture of paint and such like articles.

Dated 28th November, 1862.

3197. A. Dudgeon, 19, Cullum street—Imp. in packing for various parts of steam and other engines and machinery.

Dated 1st December, 1862.

3218. J. Coppard, Hoxton—An appliance or appliances for horse shoes, to produce the effect of what is termed roughing.
3223. B. Oldfield, Coventry—Imp. in looms.

Dated 4th December, 1862.

3249. H. Swan, Bishopsgate-street-without—Imp. in stereoscopic apparatus.
3251. R. D. Kay, Accrington—Imp. in the manufacture or finishing of endless machine blankets, or endless lappings for printing purposes.
3253. F. D. Delf, Liverpool, and T. C. Gibson, Ramsey, Isle of Man—Improved means and apparatus, whereby petroleum and other oils and hydro-carbons can be safely carried and stored.
3255. H. Castlebon, 15, Passage des Petites Ecuries, Paris—An improved press to be used in the manufacture of tiles and bricks.
3257. J. Biggs, J. Johnson, T. Richardson, and T. Arnold, Leicester—Imp. in warp fabrics.
3259. R. Hornsby, jun., Grantham, Lincolnshire—Imp. in apparatus for cutting and pulping turnips and other vegetables.

Dated 6th December, 1862.

3261. M. Tildesley, Willenhall, Staffordshire, and E. Sharpe, Swadlincote, Derbyshire—Imp. in the manufacture of earthenware knobs, and in fixing them in spindles used with certain kinds of knobs, in securing the metal mounts upon such knobs, and in apparatus to be employed in certain parts of this manufacture.
3262. L. Christoph, Paris, W. Hawksworth, Linlithgow, N.B., and G. P. Harding, Paris—Imp. in drilling, drawing, and rolling metals, and in the machinery or apparatus employed therein.
3263. E. B. Wilson, Parliament-street, Westminster—Imp. in railway wheels, and in the mode of manufacturing the same.
3265. J. M. Rigby, Manchester—Imp. in presses for pressing cotton or other fibrous materials.
3267. W. J. Smith, Brooklands-cottage, Sale, Cheshire—Imp. in the manufacture of collars, cuffs, and wristbands.
3269. C. Galleti and F. Stefano, Charles-street, Hoxton—Imp. in articles of furniture.

Dated 6th December, 1862.

3271. R. Thorp, Liverpool—Improved coating or covering for steam-boilers and other surfaces to prevent the radiation of heat.
3273. G. Wright, Friern Manor, Peckham Rye, Surrey—Certain imp. in the preparation and manufacture of food for cattle.
3275. J. Campbell, jun., Belfast—Imp. in means or apparatus for heckling or hackling flax and other fibres.
3277. E. Ullmer and W. Ullmer, Castle-street—Imp. in cylinder printing machines.
3281. Capt. W. Palliser, 18th Hussars, Dublin—Imp. in screw bolts

Dated 8th December, 1862.

3282. G. Lowry, Salford—Imp. in machinery for hackling flax, and preparing to be spun flax, hemp, tow, and such like materials.
3283. J. L. Budden, Fenchurch-street—Imp. in means or apparatus for obtaining and applying motive power for propelling or other purposes. (A com.)
3284. J. Sellars, Pendlebury, near Manchester—Imp. in the manufacture of pulp or half stuff used in the manufacture of paper, pasteboard, and similar articles.
3385. P. Todd, Wheelton, Lancashire—Certain imp. in "pickers" used in looms for weaving.
3287. G. A. Huddart, Brynkir, Carnarvon—Imp. in buttons.
3289. W. E. Newton, 66, Chancery-lane—Imp. in preserving animal substances. (A com.)
3293. J. A. Kiesling and C. L. Kiesling, Liverpool—Improved means of renewing worn out and partially worn out files and rasps.
3294. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the construction of steam generators. (A com.)

Dated 9th December, 1862.

3295. T. Wingate, jun., Glasgow—Imp. in dredging machinery.
3297. M. F. Benton, 21, Percy street, Bedford-square—Imp. in the manufacture of gunpowder. (A com.)
2299. R. A. Brooman, 166, Fleet-street—Imp. in treating liquorice root to obtain liquid and solid extracts therefrom. (A com.)
3301. J. Howard, J. Bullough, and T. Clegg, Accrington—Imp. in machinery or apparatus for preparing cotton or other fibrous materials to be spun.
3303. P. Effertz, Manchester—Imp. in machinery or apparatus for making bricks, tiles, drain pipes, and other similar articles.
3305. E. B. Wilson, 5, Parliament-street, Westminster—Imp. in machinery or apparatus for rolling metals.

Dated 10th December, 1862.

3306. J. Lamb, Newcastle under-Lyne—Imp. in the manufacture of tissue paper for transferring patterns and designs.
3307. W. Inglis, Montreal, Canada—Imp. in steam boilers.
3309. J. R. C. Taunton, Birmingham—Imp. in the manufacture and ornamentation of metallic bedsteads and other articles of like manufacture.
3311. M. Osborne, Birmingham—Imp. in the manufacture of cast-iron fenders.
3316. J. King, Heanor, Derbyshire—Imp. in apparatus used for signalling on railways.
3317. E. Toynbee, Lincoln—Imp. in extracting oils and fatty matters from shoddy or refuse wool, skins, or skin pieces, glue pieces, cotton waste, and other animal or vegetable matter, and in producing an artificial manure.

Dated 11th December, 1862.

3319. W. Tristram and H. Brereton, Halliwell, near Bolton-le-Moors—Imp. in machinery or apparatus for sizing yarns and threads.
3321. R. A. Ronald, Glenpatrick, Renfrew, N.B.—Imp. in printing textile and felted fabrics, and in the machinery or apparatus to be used therein.
3323. A. W. Burgess, 107, Strand—Imp. in the preparation of anchovies.
3325. W. Goulding, 17, Margaret street, Leicester—Imp. in ploughs.

Dated 12th December, 1862.

3327. G. Winiwarter, 32, King street, Cheapside—Imp. in the construction of portable houses, walls, or partitions of buildings, strong rooms, safes, refrigeratories, reservoirs, piers, and other structures, also applicable to the construction of casks and similar articles, boats, and ships.
3328. H. Sanderson, Sheffield—Imp. in the manufacture of table and other knives and forks.
3331. C. Hancock, West-street, Smithfield, and S. W. Silver, 4, Bishopsgate-street—Certain compounds and substances applicable for electric insulation and other purposes.

3333. G. G. Clark, 30, Craven-street, Strand—I np. in fortification for the defence of ships, batteries, and forts.
3334. S. Fox, Stockbridge Works, Deepcar, near Sheffield—Imp. in retorts and apparatus employed for the manufacture of gas, and also in purifying gas.

Dated 13th December, 1862.

3335. J. Brown, Sheffield—Imp. in the manufacture of armour plates.
3336. J. W. Baker, Bury, Lancashire—Imp. in machinery or apparatus for spinning cotton and other fibrous materials.
3337. J. Brown, 23, Sidney-street, Commercial-road East—Imp. in hydraulic machinery.
3838. E. Thorold, Lee, Kent—Imp. in drill braces, which imps. are also applicable to spanners.
3339. C. Corbet, 69, Upper Gardiner-street, Dublin—Imp. in rails for railways, and in the mode of forming the joints of the same.
3340. R. Aitken, Cambridge-street, Pimlico—Imp. in locomotive engines.
3341. J. Petrie, jun., Rochdale—Imp. in machinery or apparatus for washing wool and other fibrous materials.
2342. J. J. Thompson, Manchester—Imp. in machinery or apparatus for making pies and for cutting meat for the same.
3343. W. E. Newton, 66, Chancery-lane—An improved mode of and apparatus for repairing the rails, points, switches, and other parts of the permanent way of railways. (A com.)
3344. M. Henry, 84, Fleet-street—Imp. in fitting or applying propellers to ships and other vessels. (A com.)

Dated 15th December, 1862.

3346. W. Bestwick, Manchester—Imp. in braiding machines.
3347. R. Stansfield and J. Dodgeon, Todmorden, Lancashire—Imp. in looms for weaving.
3348. G. Buchanan, Bucklersbury—Imp. in machinery used in crushing sugar canes.
3349. W. Phelps, Nottingham—Imp. in locks.
3351. E. B. Wilson, 5, Parliament-street, Westminster—Imp. in machinery or apparatus for rolling metals.
3352. R. Kirk, Glasgow—Imp. in machinery or apparatus for checking or stopping the motion of railway carriages.

Dated 16th December, 1862.

3353. J. McInnes, Liverpool, and E. F. Prentiss, Birkenhead—Imp. in the distillation and treatment of petroleum and other like oils to obtain products therefrom, and in the apparatus to be used therefor, parts of which can be applied for distilling other liquids.
3355. G. C. Warden, Islington—Imp. in ornamenting textile fabrics, leather, and other surfaces, in a cement employed therein, which is also applicable to the waterproofing of fabrics and materials, and in apparatus for applying and spreading such waterproofing cement. (A com.)
3356. J. S. Hancock and S. Hancock, Sheffield—Imp. in "anti-garotte" knives.
3359. W. Smedley and A. Smedley, Nottingham—Imp. in machinery or apparatus for the manufacture of textile or looped fabrics on warp lace machines.
3360. W. Hudson, H. Moore, C. Catlow, and S. Newburey, Burnley, Lancashire—Imp. in looms for weaving, and in arranging the warps therein.
3361. J. L. W. Thudichum, Kensington—Imp. in collecting human excreta, and in the apparatus and means employed therein.
3362. G. C. Wallich, M.D., 17, Camden hill-road, Kensington—Imp. in apparatus to be used in deep sea sounding for ascertaining the pressure and for raising specimens of the water.

Dated 17th December, 1862.

3365. R. Hattersley, Manchester - Imp. in apparatus for classing printers' types for composing machines.
3366. W. Tongue, Bradford—Imp. in machinery and processes for preparing fibrous materials.
3367. A. Albini, Birmingham—Imp. in breech-loading fire-arms.
3368. C. Defries, Houndsditch—Imp. in the manufacture or construction of lamps.
3369. T. Knowles, Ashton-under-Lyne—Certain imp. in machinery or apparatus to be employed in preparing and spinning cotton and other fibrous substances.
3370. J. R. Hampson, Manchester—Certain imp. in the method of securing the extremities of the hoops or bands employed in packing bales, and in apparatus connected therewith.
3371. J. Thorne, Cardington-street, Hampstead-road—Imp. in apparatus for regulating the flow of gas to burners.
3372. J. Ramsbottom and G. Hacking, Accrington—Imp. in machinery or apparatus for measuring and registering the flow of water and other fluids.
3373. J. W. Hawden, Kebroyd Mills, near Halifax—Imp. in machinery or apparatus for spinning, twisting, and doubling cotton and other fibrous materials.
3377. R. Wheeler, High Wycombe, Buckinghamshire—Imp. in ploughs.
3378. H. Burton, Princes-terrace, Prince of Wales-road, Kentish-town—Imp. in castors for furniture and other purposes.
3379. G. A. Huddart, Brynkir, Carnarvon—Imp. in buttons.
3380. W. Clark, 53, Chancery-lane—Imp. in holders for lamps, candles, and other lights. (A com.)
3381. C. J. L. Leffler, Gefle, Sweden—Imp. in constructing armour for ships and fortifications.

Dated 18th December, 1862.

3384. J. Clayton, Wolverhampton—Imp. in reverberatory furnaces for heating large masses of iron and steel, and in economising the waste heat of the said furnaces.
2386. G. Russell, Glasgow—Imp. in cranes.
3388. J. Brierley and A. Brierley, Spa Mill, near Huddersfield—Imp. in carding engines.
3394. I. Holden, Bradford—Imp. in means or apparatus employed in preparing and combing wool and other fibres.
3396. J. L. W. Thudichum, Kensington—Imp. in the preservation of beer and other fermented liquids, and in the apparatus and means to be employed therein.

Inventions with Complete Specifications Filed.

3383. E. Lepainteur, Paris—Imp. in the fabrication of a salt for dyeing textile materials.—18th December, 1862.
3415. G. E. M. Gerard, Paris—Imp. in the fabrication of threads from vulcanised india rubber, and the apparatus connected therewith.—22nd December, 1862.
3422. F. Parker, Cambridge—Imp. in carriages.—23rd December, 1862.

Patents Sealed.

[*From Gazette, December 30th*, 1862.]

December 30th.
1915. E. F. Prentiss.
1917. R. A. Brooman.
1918. C. Lungley.
1919. G. H. Birkbeck.
1920. J. Greenhalgh and J. Greenhalgh.
1926. J. James.
1929. T. L. Atkinson.
1930. G. H. Hulskamp.
1931. J. Murray.
1933. J. Crisp and J. W. Elliott.
1935. G. Bedson.
1936. J. M. Hetherington and T. Jackson.
1942. T. O. Dixon.
1945. W. J. Cunningham.
1946. A. Drevelle.
1948. J. Howard and J. Bullough.
1950. R A. Brooman.
1952. C. G. Hill and W. Jackson.
1953. A. Warner.
1854. P. B. O'Neill.
1960. W. Spence.
1985. H. Kellogg.
2002. C. E. Green and J. Green.
2147. A. Boyle and T. Warwick.
2209. M. A. F. Mennons.
2316. W. E. Newton.
2536. E. Astel.
2612. M. A. F. Mennons.
2876. J. A. Nicholson.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, December 30th*, 1862.]

December 22nd.
2920. G. F. Stidolph.
90. A. C. Twentyman.

December 23rd.
2932. J. Giles.
2936. D. Hulett and G. Boccius.
2953. X. C. de Nabat and A. C. de Nabat.

December 24th.
2992. H. Cochrane.

December 26th.
2990. J. Whitworth.

December 27th.
2958. A. McDougall.
2967. S. King.
2969. J. S. Crosland.
96. J. Goddard.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, December 30th*, 1862.]

December 24th.
2925. C. May and E. A. Cowper.
2950. T. Holmes.
117. J. Hamilton, jun.

December 26th.
2938. G. Chisholm.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No.	Date of Registration.	Title.	Name.	Address.
4530	Dec. 18	Anti-Garrotting Cravat	Walter Thornhill	144, New Bond-street.
4531	,, 30	Rhomboidal Body for Metal Printing Types of an italic or other sloping character	Stephenson, Blake, and Co....	Sheffield
4532	,, 31	An Expanding Travelling Bag	John Harrison	Birmingham.

Journal of the Society of Arts.

FRIDAY, JANUARY 9, 1863.

NOTICE TO MEMBERS AND INSTITUTIONS.

Exhibition Catalogues.

Her Majesty's Commissioners for the International Exhibition of 1862 have placed at the disposal of the Council, for distribution to the Members of the Society and Members of the Institutions in Union, copies of the Industrial and Fine Art Catalogues.

Members of the Society desiring to have copies of each of these Catalogues may have them on application, either personally or by an authorised agent, at the Society's House.

General Index.

A general Index to the first ten volumes of the *Journal* is in the course of preparation, which may be bound with the last volume. Members who desire to have copies (which will be supplied *gratis*) are requested to apply to the Secretary as early as possible, in order that a sufficient number may be printed. As soon as it is printed it will be sent to each member who has made application for it.

AWARDS OF MERIT AT INTERNATIONAL EXHIBITIONS.

(*Continued from page* 123.)

In August last the Council of the Society of Arts issued a letter, inviting the opinion of the Jurors, the Commissioners for the Colonies and for Foreign countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and requesting replies to the questions given below, with the intention of embodying the answers in a public report.

AWARDS OF JURIES.

1.—Are you of opinion that Awards for Merit, by medals or otherwise, in International Exhibitions, are desirable?

2.—State the reasons for your opinion.

3.—Ought Works of Fine Art and Designs to be excluded from the awards?

4.—Can you suggest any better method than the appointment of jurors for making the awards?

5.—Can you suggest any improvement in the constitution or proceedings of the juries?

6.—Is any appeal from the decision of the juries desirable?

7.—If you think awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?

8.—Have you any further suggestions to offer on the subject?

The following is a summary of the replies received. The figures attached to the replies correspond with those of the questions:—

William Holland (Holland and Sons), Juror and Exhibitor, Class XXXa.—1. No. 2. Difficulty of obtaining a jury "International," whose decision would be practically correct. Evil of commendation conferred or omitted, a great wrong; great expense and outlay is apt to have too much consideration, in opposition to simplicity or beauty of design, and, again, jurors sympathise with their fellow-sufferers, and lean to the influential houses; this expense in the first production was often most ridiculous, for mere vulgar parade, as no purchasers can be found for such extravagant articles. An award given to an exhibitor for one article in a large group (in which some articles have been much condemned) is paraded before the public, printed on a hundred cards attached to every article, and deceives or disgusts. 3. Certainly not excluded if medals be given.

George N. Hooper (Hooper and Co.), Juror and Secretary, Class VI.—1. Awards for merit are justifiable and expedient under certain conditions; if these cannot be fulfilled it would be better to abolish them. They should be distributed with absolute justice, but admitting that to be impossible, they should be distributed with as perfect justice as human means can devise and carry out. 2. Although a small proportion of the public, and a somewhat larger proportion of the exhibitors, are capable of forming a correct judgment on what has been to them a special study, the great mass of visitors know very little of the peculiar properties, uses, and construction of such an infinity of objects as are shown in great national industrial exhibitions, and they cannot possibly devote the time to ascertain what comparatively few know thoroughly by the devotion of a lifetime. By affixing the reasons for the award on each object rewarded, the public would be taught to discriminate, and to become acquainted with the particular excellence that distinguishes it; it is even probable that the jurors might much improve most manufactures by also indicating the chief defects in the least carefully manufactured goods exposed; they might, however, do it at the risk of injuring some honest and industrious exhibitor, who might be creditably maintaining himself and family, and although not a clever manufacturer, in many respects a useful citizen; the advantage might, therefore, be dearly purchased, unless very carefully and judiciously carried out. It is in some cases a means of distinguishing a skilful, but little known, manufacturer, who might not otherwise obtain his fair share of public favour. 4. No. 5. I would suggest that jurors be nominated by ballot, by exhibitors, under the control of a chief commissioner, as at present; that two-thirds of the jury should be practical manufacturers (for most manufactured articles); that the interests of the purchasers should be represented by one or more persons, of high station and attainments, chosen by the commissioner from names submitted by the exhibitors; that the commissioner should offer advice on doubtful matters, and assist in forming juries when, from various reasons, the exhibitors cannot do so. Foreign jurors should be experts, and practically acquainted with the manufactures they are called upon to judge; if there should be any great objection to this, an associate foreign juror should, of necessity, be an expert. The jurors should be enabled to examine the goods privately and deliberately, without being accompanied by a crowd of lookers-on, who impede the business, and occasionally prevent a free interchange of opinion on the merits and defects of the articles under examination. 6. No; the work would be almost endless (unless under special conditions, one of which might be that an exhibitor who claimed to have his goods re-examined should previously engage in writing to allow to be affixed to his goods the reasons of the jury for withholding an award, if, on reconsideration, the decision should not be in his favour, or the reasons might be published with the list of awards). However, the greatest possible care should be

taken to ascertain that the goods are properly classed; that they are shown in their class; that they are included in the catalogue; and that a short description should be attached to each exhibitor's goods. 7. No. 8. No.

MANLEY HOPKINS, Commissioner of the Sandwich Islands—1 and 2. Awards, &c., are desirable when sparingly administered; the value of a reward being in direct ratio with its rarity. Rewards cease to be a distinction when they are lavishly distributed. There are private schools where, to make all the parents satisfied, every boy goes home with a prize. 3. Thinks not. 4. Possibly the selection of one man of acknowledged taste and impartiality, if he can be found and agreed upon, particularly as *arbiter elegantiarum.* 5. None. 6. No, it would lead to endless controversies. 7. Possibly the test of comparative demand by the public.

JOHN HUNT (Hunt and Roskell), Juror and Exhibitor, Class XXXIII.—1. Yes. 2. Foreigners would not be satisfied without awards, and considers awards of great value to enterprising exhibitors young in business. 3. Works of fine art and design ought not to be excluded. Exhibitors, whose works are distinguished for art and design, should have the higher class medal awarded to them, in addition to the second medal for good workmanship, if entitled. Impossible to make satisfactory awards with only one class of medals. 4. Cannot suggest any better method. 5. Judging from his own experience, cannot suggest any improvement in the constitution or proceedings of juries. 6. Considers that power of appeal to the council of chairmen desirable; the council in such cases should take the opinions of some of the jury. 7. Cannot suggest any better means. Attaches great importance to the reports, which should be prepared with great care, and faithfully record the reasons for the various awards.

GRIFFITH JARRETT, Exhibitor, Class VIIB.—1. "Awards for merit" might have been desirable in some cases before the inauguration of International Exhibitions. Since then, they are not only unnecessary but mischievous. 2. The just boast of promoters of International Exhibitions is that they bring the whole world together to inspect each other's productions. The general public, the best judge of any real excellence, is not slow to reward by bestowing its patronage, whereas jurors inspect many articles with which they are not conversant, and yet pretend to form a judgment from a few minutes' cursory inspection of what may have cost the exhibitor years of deep thought and laborious effort. The verdict of the jurors has rarely been ratified by the public. 3. Works of fine art and design should not be excluded. 4. Yes; let the public be in name, as it is already in fact, the judge. 5. If jurors must be appointed, let the foreign jurors be the judges of English articles, and, *vice versa*, no party in the same town or locality the proper judge of his rival's productions. 6. Yes; a superior board open to the public should be constituted, where the inventor and his juror might confront each other, the former, if he felt himself unfairly treated, might bring the merits of his invention before this superior board, and where the juror would have to explain on what grounds he passed over or inadequately rewarded the article. 7. International Exhibitions serve the very purpose desired. 8. If International Exhibitions are to be fostered and made periodically, an early intimation that the present system of jury awards has been condemned, and will be discontinued, is most essential to their success.

HENRY JONES, Junior, Exhibitor, Class XXXVIIIA.—1. Yes; awards may take the form of (*a*) a mere report; (*b*) a mention; (*c*) a certificate; and (*d*) a medal. Object of awards to ensure publicity to merit; a mixed system is most likely to effect that object. A report should be printed for public sale, and there should be, in addition, at least two orders of merit, differing outwardly as much as possible. 2. The principle of international exhibitions is competition; end partly attained by the mere fact of exhibiting. The end is more completely realised through the guidance of the judgment of competent persons. Awards hold out a wholesome stimulus to individuals, independently of pecuniary advantages; if awards abandoned, displays of this kind would be shorn of an interesting, distinctive, generic, and important feature. Main objection to awards, the difficulty of meting out fair and equal judgments; but if, in other matters, awards were refused on that account, irreparable injury would accrue. The jurors should be most carefully selected, not merely on account of their capabilities, but also of their freedom from prejudice. Under the most perfect system, injustice would probably be done to some few; but, on the whole, far greater benefits would be conferred on the mass. 3. Works of fine art are not eligible for awards; the principle of competition does not apply to them; possession of works of art can be compassed by any one who has money enough to buy them. The case of art designs is different; here the principle of competition does hold; but awards should only be made where the exhibitor is also the designer. It may be objected that, on the same principle, awards should not be given to manufacturers, but to their skilled workmen, who produce the goods, and their agents, who purchase the raw material. But here, in addition to finding the capital, the manufacturer finds personal superintendence. It is the most enterprising manufacturers (*i.e.*, the best superintendents) who are entitled to awards, and it is precisely those who give the best superintendence that will get the best materials, and engage the best workmen.

HENRY L. KEELING, Juror, Class IIIB.—1. Yes. 2. They produce emulation, and the disappointment of those who are not successful proves this. 3. No. 4. No. 5. Jurors being selected from those conversant with the trade they represent, and disinterested, not being exhibitors, leads to an impartial decision, but time should be afforded them for decision. 6. Yes, the principle is characteristic of the constitution of this country, and the appeal should be to the chairman of juries. 7. Awards and honourable mention the only means, but there should be an award of a superior character to the most eminent in any branch of science, art, and commerce. 8. The want of a supplementary report of the jurors was severely felt; the hurried manner and the imperfect state in which the International Exhibition was, at the opening, rendered the work of the jurors nugatory for some weeks. This and the order to make the awards at a very early fixed date, led to omissions which might have been remedied by a supplementary report, which would have satisfied many exhibitors who have considered themselves unfairly passed over. This it is to be hoped will be obviated in any succeeding exhibition.

KNIGHT, BEVAN, AND STURGE, Exhibitors Class XA., confine themselves to the 6th query.—6. If awards for merit by medals are desirable, then unquestionably an appeal from the decision of juries is also desirable. The stake at issue, whether a medal be obtained or not by the exhibitor, is in some trades an important one, and would be estimated at a very high money value. It must be shown, therefore, that it is impossible to find a juryman who is not superior to every interested motive before it can be established that, without an appeal, no gross miscarriage of justice can take place, it being admitted that if such miscarriage is possible, then the system becomes a great commercial oppression. It is obvious that a large proportion of jurymen are somewhat indolent, and very happy to leave anything to one of their colleagues who may busy himself about it, and be believed to have a thorough acquaintance with such matters. *One* interested juryman has consequently many chances of gaining his point, because he knows all along the end for which he is working. In the awards for Portland cement, it ought to be explained, if juries are infallible, how it happened that none of the cement shapes submitted by two of the principal houses in the trade, for the express purpose of being tested,

were not tested by breaking force, although these tests are in daily use at all important public works, and no delivery of cement would be accepted at the Metropolitan Board of Works, at the Breakwater Works (at Alderney or Dover), without being thus treated, which is the only recognised method of proving the superiority of cement. It ought further to be shown why and how it was that houses who exhibited specimens of the highest strength which ever invited inspection, as well as large breakwater blocks, selected from the best deliveries at Dover and Alderney, were passed by in silence, and a medal given to a firm whose name was not to be found in the catalogue, and who had never applied for nor occupied space. The executive, whose mission it appears to have been to defend everything that could possible happen, explained that the firm in question, "applied to be considered as exhibitors before the labours of the juries commenced, and acting upon the precedent of 1851 her Majesty's Commissioners consented that the cement applied to certain brick piers, as well as to other parts of the building, should be considered as the cement exhibited by them." But if a court of appeal had existed, it would have been proved, firstly, that these brick piers had been painted over before the exhibition opened, and could not therefore have been seen by the jury; secondly, that the firm in question had not constructed anything themselves; thirdly, that the contractors, while using their cement, had likewise used ours without in any way separating the use of the two, and employed the cement in the ordinary way of business as mortar or stucco, without any intention at all in reference to exhibition.* It is, then, because we believe that juries are not infallible—not only in judgment, but also not necessarily in impartiality—that we deem a court of appeal essential.

A. J. Langley, Commissioner for Vancouver's Island.—1. Testimonials for merit are desirable. 2. Because they are stimulants to invention and excellence. 3. Works of fine art and design should not be excluded from a public acknowledgment—a due reward to the artist, who is seldom well remunerated in a pecuniary manner. 4. No more practical method than juries. 5. Suggests that the labours of the juries would be simplified, and visitors' attention directed, if each exhibitor were requested to denote, with a specified mark, those objects in his contribution which he thought particularly worthy of notice. 6. A few days should be allowed for appeals, as in the immense number of claimants many deserving ones are liable to be overlooked. 7. Instead of medals, gives preference to the print from a well-engraved appropriate design, to which the signature of eminent person or persons were attached, as well as the reason why such certificate was bestowed. 8. Perhaps it would be generally approved if no award were given for any article of manufacture which was not an invention or proof of progress during the time elapsed since the previous Great Exhibition; and in this light each country's contribution should be inspected; as an instance, Vancouver and British Columbia, having become colonies since 1851, some mention should have been made of their gold contributions, although the metal does not differ materially from that of other countries. In conclusion, I doubt whether the onerous duties are sufficiently rewarded, or, at least, whether they would not be more satisfactorily performed if acknowledged in a more marked manner.

Richard Lansdale, Exhibitor, Class VIII., had "honourable mention" in Class XXXIa.—1. Yes. 2. They are much sought for and considered a meritorious distinction, in many cases resulting in great commercial advantages, therefore, as international exhibitions are intended as a popular encouragement of arts, sciences, &c., is in favour of awards. 3. Works of fine art and designs should be included if, by any possibility, a competent jury can be found. 4. Can suggest no better method. 5. Her Majesty's Commissioners, by reserving to themselves the right of confirming or rejecting the awards of the juries (clause j., decision No. 11), manifest a considerable care for exhibitors' interests, and, except that the jury in Class 8 (in whose awards the writer is interested) have never once inspected his exhibit, he finds no fault with the constitution or proceedings of juries. 6. Appeals are desirable, and particularly so in instances where juries have been called upon for decisions in classes to which they were not originally accredited, for Her Majesty's Commissioners, having recognised the all-important principle of personal qualification in the selection of their jurors, it follows that exhibitors suffer a greivous injustice if juries of one class be allowed to delegate their powers to juries of another class.

John R. Lavanchy, Associate Juror and Joint Reporter, Class XXI.—1. No. 2. Without, no foreigner would exhibit; doubtful if any English in some classes. 3. No. 4. By their appointment being made by the Crown officer, without reference to list given by exhibitors. 5. No juror to be named who exhibits in any other class than the one to which he may belong, and which would exclude him from any award. 6. Certainly not. 7. Each class should have two or three medals, "Superior," of gold or silver, to be called "gold" or "silver" prize, the bronze "Prize medal," by which would be avoided the denomination of first or second. Honourable mention should be retained.

J. and J. Leighton, Exhibitors, Class XXVIII.—1. Yes; if they could be fairly adjudicated. 2. Awards are certainly an extra incentive to exhibitors. 3. Certainly not. 4. No; but the juries being appointed, the duties are very responsible, and should not be brought to a conclusion with unseemly haste, as in many cases they have been in the present Exhibition. 5. Not having a copy of "the constitution or proceedings of the juries," but judging by the result in the present awards, have no doubt that it has worked very badly. In one class there are several medals awarded to exhibitors in another class (who had already received medals in their own class), by jurors who have gone out of their way, giving medals to names who do not exhibit in the class at all, and for goods of which the receivers of the medals are not the manufacturers. At the same time, the very jury excused themselves for the injustice they committed to their own exhibitors by stating that they had not enough medals at their disposal to reward all who deserved them in the class to which they (the jurors) were appointed to judge. 6. Absolutely necessary, as thereby an act of wilful or accidental injustice done by a jury (if clearly proved) can be adjusted. 7.

* In justice to the firm referred to above, it is right that their statement of the transaction should be given. It is as follows:—"In the course of the works the opportunity that we expected presented itself. Under the eight iron columns which support each dome are as many massive circular brick piers, which were covered with much care and skill with Portland cement, and which we asked from the proper authorities permission to have considered as our exhibit. This permission was granted, and it was intended that our names should be engraven on these piers—an arrangement strictly analogous in its nature to that which has permitted the coloured glass used in the circular windows at either end of the nave (that is to say in the construction of the building) to be deemed the exhibit of Messrs. Hartley, of Sunderland, by whom it was furnished. Unfortunately for us, at the last moment a question affecting the decoration of the building arose with regard to these piers, and though every effort was made by the gentleman in charge of that department to meet our views, it was found necessary, in order to preserve harmony of colour, to cover what certainly was not a 'common piece of Portland cement stucco' with a wash resembling granite or porphyry, thus completely hiding the original material. There still, however, remained examples of our cement, from which it was easy for a jury of scientific persons to apprehend its merits. One of these was the lining of the basin of the Majolica Fountain, which, finished one day and filled with water the next, was examined by the jury during its construction as offering one of the most interesting examples that could be presented of the water resisting properties of this cement."—*Ed. S. A. J.*

No. 8. Better give no medals than scatter them broadcast without due consideration of the merits of exhibitor.

Eugene Leloup, Inspecteur de la partie industrielle de Belgique.—1. Incomplètement; à mon avis il serait bon d'accorder à chaque exposant une médaille de participant, et de nuancer en deux ou trois catégories les autres récompenses. 2. La médaille de participant contenterait les industriels exposants des objets d'une valeur secondaire. Les autres médailles stimuleraient plus efficacement les constructeurs sérieux, et constitueraient une valeur réelle un peu contestable avec le systême actuel. 3. Non. Le dessin est l'œuvre-mère de la production, et a souvent une valeur plus grande que l'objet exécuté. 4, 5. Le systême de jury pour adjuger les récompenses me paraît bon, mais il laisse à désirer sous le rapport de sa construction; je crois qu'il serait extrêmement désirable de voir adjoindre aux jurys des hommes pratiques qui feraient une étude préalable des objets. 6. Non; avec les mesures qui précèdent, les cas d'appel deviendraient je crois fort rares. Je crois que ce serait faire chose utile de provoquer un *meeting* pour examiner et discuter la valeur des observations et avis produits sur le sujet.

H. Letheby, M.B., F.L.S., Officer of Health for the City of London, Juror, Class IIIb.—Regrets that being about to leave London for some weeks he has not time to answer all the questions submitted. One of the questions is so very important, that it demands attention, viz., Question No. 5. Hardly anything was more perplexing to the Jurors in the writer's department, Section B., Class III., than the finding out in the whole range of the Exhibition the various things belonging to the class; and when they were discovered, there was the still greater difficulty of getting precise information about them. For his own part, he spent days in the most profitless manner in endeavours to learn all about the subjects submitted for awards; and it was forced upon his mind that the business of the jurors and the soundness of their verdicts would be considerably aided by the appointment of a paid officer in each class and section of a class, who should make himself thoroughly acquainted with everything exhibited in the class throughout the building, and whose services should be entirely at the disposal of the jurors of the class. This officer should be appointed by the jurort of the class, and he should be responsible to them and to them alone for the proper performance of his duties. He should also do the work of the under-secretary of the class, and should collect such information in respect of details of processes, &c., &c., as would be of service to the reporter in drawing up his report. Speaks with much feeling on this subject, because he has most unexpectedly had to draw up the juror's report of his own class, and has found no materials for the work. The juror's report, if properly done, would be the most valuable record of the progress of industry; and, to accomplish this, there should be a paid associate to gather up the materials.

Stephen W. Lewis, Juror, Class XX.—1. Honorary rewards, such as medals, if awarded by competent judges, are of value, and become objects of ambition to manufacturers. 2. Both the export and the retail trade of the country are in a great measure carried on by persons generally dealing in many articles, of scarcely any of which are they really good and intelligent judges. They are consequently not always able to distinguish between a really good article and a mere showily-made one, and are therefore obliged to trust to the good faith of those from whom they buy, which is not always to be depended upon. To such buyers the mark of a medal, judiciously awarded and fairly earned, would be of great value, and to the public generally the mark of such an award would become a guarantee of the worth of an article, and the best of all trade marks. 4. Cannot. 5. Suggests—*a.* That different classification should be adopted, dividing raw materials from manufactures, a correct appreciation of each class requiring men of somewhat different aptitude and practical knowledge. *b.* That juries composed of men of different nations, and speaking different languages, do not work well together, and do not really carry out the aim and object of their appointment. Each foreigner is, and feels himself to be, the representative and the advocate of his country, and naturally enough seeks to obtain the greatest possible number of awards for his own countrymen; and, as on each jury, foreigners when acting together could always obtain a majority, or even, when not actually coming to a vote, could almost always carry their point from a feeling of courteous civility on the part of the English jurors, the result has been that the awards have depended upon conditions totally distinct from mere merit—such as former achievements—or positions—or personal influence—or even, as in one instance, because the exhibitor, as a member of the Chamber of Commerce of his town, had been a warm advocate of the English treaty, although professedly showing second-class goods of no merit, which were, however, a fair type of his usual production. *c.* Men speaking different languages cannot themselves discuss or enter into the points of a discussion by others, on subjects requiring a technical knowledge of the language used, and although a certain acquaintance with foreign languages is to some extent general, still it is, in very many instances, very superficial, and is not sufficient for any serious use, and many men, most competent in every other respect, have not even any such acquaintance, slight as it may be. On the jury of Class XX. was a Spaniard, who could not speak or understand a word of any language but his own, which no other member of the jury understood, and many amongst the English jurors in the different classes had but the very slightest knowledge even of French, the language of most use for such intercourse; and if such the disadvantages attending the appointment of foreigners as ordinary members of the juries, how much greater the disabilities of a foreign chairman, upon whom, in a much greater degree, depends the satisfactory conduct and management of the business. *d.* Juries in the United Kingdom should be composed exclusively of Englishmen, with power to obtain such information as might be required from the commissioners representing the foreign exhibitors, who should be requested to name competent persons to represent the various industries of their respective countries. *e.* The jurors should be named by a majority of votes of the intending exhibitors. *f.* The juries for manufactures should be composed, in about equal parts, of manufacturers, of merchants, or wholesale dealers, and of retailers, thus combining practical working knowledge of the various processes, correct appreciation of commercial values, and intimate acquaintance with the wants of the consuming public, while those for raw materials should be composed of merchants and manufacturers only, thus combining commercial judgment with technical experience. *g.* It is absolutely necessary that a well-digested rule of conduct and decision should be drawn up for the guidance of the juries; in the present exhibition each jury has decided according to its own fancy, or rather according to the varying fancy of the varying majority present on any given day of meeting, without any uniformity of principle or rule. Rules should be authoritatively laid down, defining for what particular merits awards should be given, whether for general excellence of quality, or for cheapness in any given class; or for suitability for particular markets; or for beauty of form or design; or for any or all of these combined; or with reference to large production; or for old standing in particular trades, as has been the case in but too many instances this year. These two last being considerations which ought never to be taken into account, for I think that one of the great advantages of exhibitions is the opportunity afforded to young houses to come before the public on a footing of equality with houses of old standing and large capital, commanding, as is the case in so many trades, all the ordinary outlets, and thus blocking up the avenues of success to others not so fortunate in the command of means, but perhaps equally,

if not more, deserving as to actual merit. *h.* It is important that no one should accept the appointment as juror who may be unable or unwilling to devote the necessary time to the work, many gentlemen having this year consented to serve who appeared to consider the appointment as simply honorary. *i.* It is absolutely necessary that the juries, when appointed, should have convenient rooms allotted to them for the transaction of their business, and always at their command, so that the meetings may be arranged so as to ensure the attendance of the greatest number of the members, and not, as in the present year, with one room for half-a dozen juries, each one, of course, wanting it during the same hours, the meetings consequently being necessarily fixed to suit the convenience of the room, and not of the jurors, many of whom were thereby prevented from attending as regularly as they would have wished. 6. Decidedly not. For to whom could an appeal be carried? If to a fresh tribunal, of whom is it to be composed, if the most competent judges are already where they ought to be, on the original jury? If to the Council of Chairmen, the natural result would be simply a reference to the Chairman of the Class, as probably the only man in the Council at all qualified to give an opinion. Moreover, would it be possible to find any competent men willing to serve as jurors, and to devote the necessary time, if the result of all their labours were liable to be reversed by any separate body? In lieu, however, of any separate court of appeal, I would suggest that before the publication of the awards, each jury should make known its decisions to the exhibitors, who should then have the opportunity, before publication, of appeal to the jury itself, and of laying before it any reasons which might exist for a revision of the award impugned. 7. Considers that honorary awards are the simplest and most practicable means for carrying out the object in view. 8. Would venture to submit the following suggestions:—*a.* That in future exhibitions, such as the present one, the body taking the initiative, whether Royal Commissioners or others, should erect a suitable building, allotting the requisite space to each class, and erecting therein suitable show-cases or courts. *b.* That manufacturers and others should then be invited to send specimens of their productions, which should be submitted for examination to competent juries, who should decide as to what might be of sufficient merit for admission and exhibition. *c.* Everything thus passed by the juries should be exhibited free of cost to the producer; admission alone would thus become a mark of superiority, and the juries might afterwards mark any surpassing merit by the further distinction of medals or other honorary awards, which would then indeed be eagerly competed for, and would become of great value. *d.* Definite space and suitable show-cases should be assigned to foreign nations wishing to exhibit, and their respective governments should be invited to sift, in like manner, all the articles submitted for exhibition, the whole, when thus passed and admitted, to be afterwards subject to the decisions of the English juries as to any further awards. *e.* None but manufacturers, or "*bonâ fide*" producers, should be allowed or invited to exhibit. *f.* All sales within the building should be rigorously prevented. *g.* The following would be some of the advantages of some such restrictions:—A smaller building would be amply sufficient, and consequently the preliminary expenses would be smaller. Greater uniformity would be obtained, and the public would be able to form a more correct idea as to the real comparative merits of the articles shown, which would all be seen under similar circumstances, without adventitious aid from needlessly or comparatively extravagant show-cases. Manufacturers having to incur no outlay beyond the risk of preparing goods liable to rejection, if not deemed by the juries to be so meritorious as to command admission, would be more willing than at present to come forward, especially young houses, to whom the cost of the show-cases and attendant expenses are sometimes matters of great moment. A more fair and complete representation of the state of each industry would thus be obtained, the advantages arising from mere admission acting as an additional stimulus. By the admission as exhibitors of manufacturers and producers only, an exhibition would become what it really ought to be, namely, a fair index of the state of the manufactures, and the produce of the different countries represented, showing truly between each recurring epoch what the progress or the retrogression may have been, and showing also the relative merits of the various nations, instead of being, like the present Exhibition, merely a vast bazaar or advertisement shop, where some of the worst features of modern trade, such as puffing, the curse of all honest competition, are allowed to predominate. If the object of Exhibitions is to be to make a profit as a vast show, the sooner we see the last of them the better, but if it be really intended to advance by their means the arts and the manufactures of the world, by bringing together and comparing the best productions of various countries, and by so doing to educate and improve the taste of the public, such a result may be more readily and truly attained by some such means as suggested above, than by any such hotchpot collection of excellence and rubbish as was to be seen at Kensington.

JOHN LINDLEY, F.R.S., Superintendent of the Colonial Department.—1. Yes, if made upon a good principle. 2. Because they act as a stimulus to exertion, and are much prized when properly awarded. 4. No. 5. Undoubtedly; but the question is a very large one, into which he has no time to enter. 6. No.

LOCK AND WHITFIELD, Exhibitors, Class XIV.—1. Yes. 2. Because it would tend to cause competition, and bring into notice the most meritorious works. 3. Certainly not. Can see no reason why they should be excluded, except from the difficulties in making the awards. 4. No; wish they could. 5. Not when their work is done with care and pains. 6. Yes; as injustice may carelessly be done. 8. Only that greater discrimination should be used in awarding prizes; for it must be apparent to any visitor that many things of small merit are awarded prizes, and many notable inventions entirely unnoticed.

JAMES MACARTHUR, Commissioner for New South Wales. 1. Yes. 2. Yes. *a.* The desire so generally evinced by exhibitors to obtain such marks of distinction. *b.* The doubt whether parties residing in distant countries, and practically those out of the European market, would undergo the trouble of exhibiting their productions, were it not in the hope of receiving such distinctions; and, *c.* because there is no experience to show the result of International Exhibitions, held on the principle of excluding awards of merit. 4. Can suggest no better mode. 5. It would be a very great improvement if there were a paid chairman, and a paid secretary, to each jury, who should be responsible for the regular and systematic discharge of the onerous and important duties confided to the jury, and bound to keep formal and sufficient records of the proceedings. By this means, it appears to me, that the chief causes of the dissatisfaction now so prevalent, as regards the working of the juries, would be obviated, and their duties placed on a far more satisfactory footing to the jurors themselves, as well as to the exhibitors and the public at large. 6. There should be an opportunity for revising awards, so as to correct omissions or mistakes. 8. Would suggest for the consideration of the Council, whether in cases of the exhibition, by one person, of several objects in the same class, each of sufficient merit for a medal (entitling such exhibitor, under the rule now in force, to one medal only), there might not, with advantage, be awarded a medal or distinction of a higher kind, and whether, also, extraordinary excellence, even although confined to one object, might not be considered as a qualification for this higher class of distinction. It may deserve consideration whether the exhibition of a given number of objects, say 4, 6, or 10, in one class or more, deserving medals, should not entitle the exhibitor to the higher order of distinction.

(*To be continued.*)

BRITISH PAINTINGS AT THE INTERNATIONAL EXHIBITION OF 1862.

The following Analysis of British Paintings, Artists, and Exhibitors, will be interesting as a record:—

CLASS 38. *B.*—PAINTINGS IN WATER COLOURS AND DRAWINGS.

ARTIST.	No. of Pictures.	No. of Exhibitors.
A.		
Absolon, John	5	5
Alexander, W.	1	1
Armitage, E.	1	1
Austen, S.	3	3
B.		
Backhouse, Mrs.	1	1
Barrett, G.	9	7
Bartholomew	2	2
Bayliss, Wyke	1	1
Baynes, J.	1	1
Bennett, W.	4	3
Blake, W.	4	2
Bone, H. P.	3	2
Bonington, R. P.	1	1
Bouvier, A.	1	1
Boys, T. S.	2	2
Branwhite, C.	3	3
Brierly, O. W.	1	1
Burton, F. W.	5	5
Byrne	1	1
C.		
Callcott, Sir A. W.	2	2
Callow, W.	2	2
Campion, G. B.	2	2
Carrick, T.	5	4
Cattermole, G.	13	12
Chalon, A. E.	1	1
Chalon, A. E.	3	2
Chalon, J. J.	3	3
Chambers, G.	2	1
Christall, Joshua	3	3
Clennell, L.	2	2
Cleveley, J.	1	1
Cole, V.	3	3
Collingwood, W.	1	1
Constable, J.	6	1
Cook, Samuel	2	2
Cooke, E. W.	2	1
Cooper, T. S.	3	2
Cope, C. W.	1	1
Corbaux, Miss F.	1	1
Corbould, E. H.	6	5
Cotman, J. S.	2	2
Cox, David, sen.	23	14
Cox, David, jun.	2	2
Cozens, J.	6	4
Criddle, Mrs.	1	1
D.		
Daniell, G. W.	1	1
Davidson, C.	3	3
Dayes, E.	1	1
D'Egville, J. H.	3	3
De Wint, P.	11	9
Dobbin, J.	1	1
Dodd, R.	2	2
Dodgson, G.	3	3
Duffield, Mrs.	2	2
Duncan, E.	7	7
E.		
Edridge, H.	4	3
Essex, W.	8	1

ARTIST.	No. of Pictures.	No. of Exhibitors.
Evans, Sam.	2	2
Evans, W.	4	4
F.		
Fahey, J.	2	2
Farmer, Miss	2	2
Fielding, Copley	8	6
Ford, W. B.	1	1
Foster, Birket	3	3
Fripp, Alfred D.	5	5
Fripp, G. A.	5	5
G.		
Gainsbrough, T.	3	1
Gasteneau, H.	2	2
Gilbert, J.	1	1
Gillico, Miss	2	2
Girtin, T.	8	5
Glover, W.	7	6
Goodall, E. A.	3	3
Goodall, W.	2	2
H.		
Haag, Carl	5	5
Haghe, Louis	3	3
Hall, G. L.	1	1
Halswelle, K.	1	1
Hamilton, W.	2	2
Harding, J. D.	2	2
Harrison, Mrs.	1	1
Hart, S. A.	1	1
Haslem, J.	5	2
Havell, W.	3	3
Hayes, E.	1	1
Heaphy, T., sen.	1	1
Hearne, W.	2	2
Herbert, J. R.	7	5
Herdman, W. G.	1	1
Hills, R.	5	2
Holland, J.	3	3
Howitt, S.	1	1
Hunt, W.	17	11
I.		
Ibbetson, J. C.	2	2
J.		
Jackson, S. P.	3	3
Jenkins, J. J.	2	2
Jopling, J. M.	2	2
Jutsum, H.	1	1
L.		
Lance, G.	1	1
Landseer, Sir E.	3	2
Lawrence, S.	1	1
Lee, W.	1	1
Leitch, W. L.	1	1
Lewis, J. F.	5	5
Linnell, J.	2	2
Liverseege, H.	1	1
M.		
Mackenzie, D.	1	1
Margetts, Mrs.	2	2
Martin, C.	1	1

ARTIST.	No. of Pictures.	No. of Exhibitors.
Martin, J.	2	2
McKewan, D. H.	4	2
Meadows, K.	1	1
Moira, E.	5	1
Mole, J. H.	4	4
Mulready, W.	7	2
Munn, P. S.	1	1
N.		
Naftel, P. J.	2	2
Nash, J.	8	6
Nesfield, W. A.	3	1
Newton, A. P.	3	3
Nicholson, F.	2	2
O.		
Oakley, O.	3	1
Owen, S.	3	3
P.		
Palmer, S.	4	4
Pidgeon, H. C.	1	1
Philp, J. G.	1	1
Philp, P. J.	1	1
Poole, P. F.	2	2
Prout, Samuel	8	5
Prout, Skinner	2	2
Pyne, J. B.	1	1
R.		
Rayner, S.	1	1
Read, S.	3	3
Redgrave, R.	1	1
Reinagle, R. R.	2	2
Reviere, H. P.	2	2
Richardson, E.	1	1
Richardson, T. M.	3	3
Richmond, G.	3	3
Roberts, D.	5	5
Robins, T. S.	1	1
Robson, G. F.	6	6
Robson and Hills	1	1
Ross, Sir W. C.	2	2
Rowbotham, T. L.	3	3
Rowlandson, T.	1	1
S.		
Sandby, P.	6	4
Schetky, J. C.	1	1
Setchel, Miss	1	1
Severn, J.	1	1
Sharp, Miss E.	1	1
Smallfield, F.	2	2
Smith, Collingwood	3	3
Stanfield, Clarkson	3	3
Stevens, F.	1	1
Stone, F.	1	1
Stothard, T.	16	3
Swinton, J.	2	2
T.		
Tayler, E.	2	1
Tayler, F.	7	6
Thomas, W. C.	1	1
Thorburn, R.	8	8
Tidey, A.	1	1

PAINTINGS IN WATER COLOURS AND DRAWINGS.—*Continued.*

ARTIST.	No. of Pictures.	No. of Exhibitors.	ARTIST.	No. of Pictures.	No. of Exhibitors.	ARTIST.	No. of Pictures.	No. of Exhibitors.
Tidey, H....	3	3	Varley, J....	5	5	Weigall, C. H.	3	3
Topham, F. W...	6	6	Vickers, A.	3	3	Wells, H. T.	10	8
Townsend, H. J.	1	1	Vinter, J. A.	1	1	Werner, Carl	4	4
Turner, J. M. W.	49	22				Westall, W.	2	2
Turner, W.	3	3				Whichelo, J.	2	2
			W.			Whymper, J. W.	4	4
U.						Wild, C.	1	1
Upton, E....	1	1	Wallis, J....	2	2	Williams, H. W.	3	3
Uwins, T....	1	1	Warren, E. G....	5	5	Wilson, A.	1	1
			Warren, H.	3	3	Wolfe, George	2	2
V.			Webber, J.	1	1	Wyld, W...	1	1
Vacher, C.	3	3	Wehnert, E. H.	2	2			

CLASS 38—PAINTINGS.

ARTIST.	No. of Paintings.	No. of Exhibitors.	ARTIST.	No. of Paintings.	No. of Exhibitors.	ARTIST.	No. of Paintings.	No. of Exhibitors.
A.						G.		
Allan, Sir Wm.	2	1	Collins, W.	12	11	Gainsborough, T.	18	16
Ansdell, R.	3	3	Collinson, J.	1	1	Gale, W.	5	5
Anthony, Mark	3	3	Collinson, R.	1	1	Gambardilla, P.	1	1
Archer, J.	2	2	Constable, J.	12	9	Gilbert, A.	2	2
			Cooper, A.	2	2	Gilbert, J. Graham	4	4
B.			Cooper, T. S.	1	1	Gill, E.	1	1
Barnes, E. C.	1	1	Cook, Richard	1	1	Glover, W.	1	1
Barry, James	2	1	Cooke, E. W.	4	4	Good, T. S.	2	1
Barwell, F. B.	1	1	Cope, C. W.	4	4	Goodall, F.	3	3
Baxter, C....	4	4	Copley, J. S.	4	2	Gordon, Sir J. W.	3	3
Beechy, Sir W.	1	1	Creswick, T.	6	6	Gosling, W. W.	1	1
Bird, E.	2	2	Crome, J.	7	7	Gow, J.	2	2
Blake, W.	1	1	Cross, J.	1	1	Grant, F.	3	3
Bond, W. J. J. C.	1	1	Crowe, Eyre	1	1	Graves, Hon. H.	1	1
Bonnington, R. P.	6	5						
Bostock, J.	2	2	D.			H.		
Boxall, W.	4	4	Danby, T.	6	6	Halliday, M. F.	2	2
Bowler, H. A.	1	1	Danby, Thomas	3	3	Hamilton, W.	1	1
Branwhite, C.	1	1	Davis, H. W. B.	2	2	Harding, J. D....	2	2
Brett, J.	2	2	Davis, W.	1	1	Hardy, F. D.	1	1
Briggs, H. P.	2	2	Dawson, H.	1	1	Hargitt, E.	2	2
Bridell, F. L.	1	1	Delamotte, W. sen.	2	2	Harvey, G.	3	3
Bridell, Mrs.	1	1	De Loutherbourg	2	2	Haslowe, G. H.	1	1
Brodie, J. L.	1	1	Desanges, L. W.	1	1	Haydon, B. R.	2	2
Bromley, W.	2	2	Dighton, D.	1	1	Hayes, E.	1	1
Brooks, Thomas	1	1	Dillon, F.	2	2	Hayter, Sir G.	2	2
Brown, F. M.	3	3	Dobson, W. C. T.	3	3	Heaphy, T.	1	1
Buckner, R.	2	2	Douglas, W.	1	1	Herbert, J. R.	3	3
			Drummond, J.	1	1	Herrick, W. S.	1	1
C.			Duffield, W.	2	2	Herring, G. E.	2	2
Calderon, P. H.	2	2	Duncan, Thomas	1	1	Hemsley, W.	2	2
Callcott, Sir A. W.	6	5	Dyce, W.	3	3	Hill, D. O.	2	2
Carpenter, Mrs.	3	3				Hilton, W.	4	4
Carrick, R.	2	2	E.			Hofland, T. C.	2	2
Cave, Thomas W.	1	1	Eastlake, Sir C. L.	3	3	Hogarth, W.	38	15
Chalon, A. E.	1	1	Eddis, E. U.	3	3	Holiday, H.	1	1
Chalon, J. J.	3	2	Egg, A. L.	4	4	Holland, J.	2	2
Chamberlayne	1	1	Elmore, A.	4	4	Hook, J. C.	5	5
Chambers, G.	2	2	Etty, Wm.	13	9	Hopkins, W. H.	1	1
Chester, G.	1	1				Hoppner, J.	3	2
Clarke, J.	3	3	F.			Horsley, J. C.	4	4
Claxton, M.	1	1	Faed, John	2	2	Howard, H.	2	2
Clennell, L.	1	1	Faed, Thomas	2	2	Hurlstone, F. Y.	5	5
Clint, A.	1	1	Foggo, J. and G.	1	1	Hughes, A.	2	2
Cobbett, E. J.	3	3	Frith, W. P.	6	5	Hughes, E.	3	3
Cole, G.	2	2	Frost, W. E.	3	3	Hughes, E.	1	1
Cole, V.	3	3	Fuseli, H.	4	3	Hulme, F. W.	2	2

Paintings.—*Continued.*

ARTIST.	No. of Paintings.	No. of Exhibitors.	ARTIST.	No. of Paintings.	No. of Exhibitors.	ARTIST.	No. of Paintings.	No. of Exhibitors.
Hunt, A. W.	1	1	Muller, W. J.	5	5	Smirke, R.	4	2
Hunt, S. A.	3	3	Mulready, W.	8	4	Smith, G.	2	2
Hunt, W. Holman	3	3	Mutrie, Miss	4	4	Solomon, A.	3	3
						Solomon, Miss	2	2
J.			N.			Stanfield, C.	5	5
Jackson, J.	2	3	Naish, J. G.	1	1	Stanfield, G. C.	3	3
Johnston, A.	3	3	Nasmyth, A.	2	2	Stone, F.	2	2
Jutsum, H.	2	2	Nasmyth, P.	4	4	Stone, M.	1	1
			Neimann, E. J.	1	1	Stothard, T.	5	5
K.			Newton, G. S.	6	5	Stubbs, G.	1	1
Kaufmann, A.	1	1	Norbury, R.	1	1	Swinton, J. R.	1	1
Keyl, F. W.	1	1	Northcote, J.	2	2			
Knight, J. P.	3	3				T.		
Knight, W. H.	3	3	O.			Tait, R.	1	1
			Oakes, J. W.	4	4	Tennant, J.	1	1
L.			O'Neill, G. B.	2	2	Thomas, G. H.	1	1
Lance, G.	3	3	O'Neill, H.	2	2	Thompson, J.	1	1
Lander, R. S.	2	2	Opie, J.	3	3	Thomson, H.	1	1
Landseer, C.	2	2	Osborn, Miss	1	1	Thomson of Duddingston	3	3
Landseer, Sir E.	9	6	Owen, W.	1	1	Turner, J. M. W.	9	7
Lawless, M. J.	3	1						
Lawrence, S.	1	1	P.			U.		
Lawrence, Sir T.	11	8	Partridge, J.	2	2	Uwins, T.	4	4
Lear, E.	2	2	Paton, J. N.	2	2			
Lee, F. R.	4	4	Patten, A. F.	2	2	V.		
Leighton, F.	2	2	Peel, J.	1	1	Vincent	2	2
Le Jeune, H.	3	3	Pettitt, J. P.	2	2			
Lenton, W.	1	1	Phillip, J.	4	4	W.		
Leslie, C. R.	12	12	Phillips, H. H.	2	2	Wallis, G.	1	1
Leslie, John	2	2	Phillips, T.	1	1	Walter, H.	1	1
Lewis, J. F.	2	2	Pickersgill, F. R.	5	4	Ward, E. M.	4	4
Lidderdale, C. S.	2	2	Poole, P. F.	2	2	Ward, J.	3	3
Linnell, J.	7	7	Prentice, J. K.	1	1	Watts, G. F.	4	3
Linnell, W.	2	2	Pyne, J. B.	3	3	Webb, W. J.	2	2
Liverseege, H.	3	3				Webster, T.	4	4
Lizars, W. H.	1	1	R.			Weigall, H.	2	2
Lucy, C.	3	3	Raeburn, Sir H.	5	5	Wells, Mrs. H. T.	6	6
			Ramsay, A.	1	1	West, B.	3	1
M.			Rankley, A.	2	2	Westall, R.	2	2
Macbeth, N.	1	1	Redgrave, R.	3	3	Westcott, P.	2	2
Maclise, D.	4	4	Reynolds, Sir J.	34	25	Whaite, H. C.	1	1
Macnee, D.	3	3	Richmond, G.	2	2	Wilkie, Sir D.	14	6
Maguire, J. H.	1	1	Roberts, D.	4	4	Williams, Henry	4	4
Mann, J. H. S.	1	1	Roberts, T.	2	2	Willis, H. B.	1	1
Marks, H. S.	2	2	Romney, G.	1	1	Wilson, A.	2	2
Marshall, G.	1	1	Rossiter, C.	2	2	Wilson, J.	1	1
Martin, J.	3	3	Rothwell, R.	3	3	Wilson, John J.	3	3
Martineau, R. B.	1	1	Runciman, J.	1	1	Wilson, R.	5	4
Mason, G.	1	1				Wingfield, J. D.	1	1
McCallum, A.	3	3	S.			Winterhalter, F.	1	1
McInnes, R.	3	3	Sant, J.	2	2	Witherington, W. F.	2	2
M'Culloch, H.	2	2	Scott, D.	2	2	Wolf, J.	2	2
Meadows, J., sen.	1	1	Severn, J.	2	2	Wright, J.	8	6
Millais, J. E.	1	1	Shee, Sir M. A.	1	1	Wyld, W.	1	1
Moore, H.	2	2	Simson, W.	2	2			
Morland, G.	5	5	Singleton, H.	1	1	Z.		
Morris, P. R.	2	2	Smallfield, F.	1	1	Zoffany, J.	5	2

CULTIVATION OF OYSTERS.

M. Coste has communicated to the Academy of Sciences an account of the progress of his oyster-beds on the west coast of France. That waves and currents carry the ova of oysters is a well-known fact, since the walls of newly-erected sluices are often covered with them; but in the island of Ré, where the inhabitants have for some years been engaged in cleansing the muddy sediment from their coast, the oysters are now permanently established. Seventy-two millions of oysters, from one to four years old, is the lowest average registered per annum by the local administration, representing a value of about two millions of francs (£80,000).

COPPER PAINT.

The Abbé Moigno describes in *Cosmos* a new pigment used in the workshops of M. Oudry, of Auteuil. Its foundation depends upon the electro-deposit of copper in an impalpable powder, which being combined with benzine, can be employed upon any surface as a paint. It possesses an agreeable lustre, and will take bronze tints by the usual chemical means. By reducing the quantity of copper, and adding bases of lead, zinc, or other metals, M. Oudry obtains a series of paints said to possess great advantages over those prepared with turpentine and ordinary oils.

WEBSTER'S OXYGEN PROCESS.

Mr. Pepper describes the new and cheap process for making oxygen, in the *Chemical News*. Mr. Webster employs a furnace, containing a strong cast-iron vessel ten inches in diameter, and in this a smaller vessel seven inches in diameter is placed, open at the top, and provided with an orifice at its base, temporarily stopped with a piece of sheet-iron, so that when its contents are exhausted, this pot may be removed, and its contents knocked out with an iron bar. The outer vessel is connected by a pipe with a 30-gallon stone-ware vessel, containing half-a-gallon of water, and eight stone-ware colanders, on which 48lbs. of the residue of a former experiment are placed, and which acts as a purifier. The inner pot is charged with 10lbs. warm dry nitrate of soda, and 20lbs. warm dry crude oxide of zinc, obtained from the so-called "galvanizing baths." A cover is then luted on, and the heat employed only sufficient to give a pasty character to the mass. Oxygen is speedily given off, accompanied by nitrous fumes, which the purifier absorbs. The end of the process is to obtain a large quantity of oxygen at a small cost; but it is mixed with nitrogen to the average extent of 41 per cent. It is expected that this mixture will prove useful to augment the illuminating power of coal-gas, and in various metallurgical processes.

NEW APPLICATIONS OF ALUMINIUM AND ITS ALLOYS.

Messrs. Bell Brothers, of Newcastle, have recently produced a new modification, which they term "whitened aluminium," in which the unpleasant zinc-like hue of the metal is obviated. They have also formed keys of aluminium, alloyed with two per cent. of nickel to increase its hardness. Aluminium bronze is now made of three qualities, the first containing ten, the second seven and a-half, and the third five per cent. of aluminium, the residue being copper. These varieties of the bronze are scarcely to be distinguished in appearance from gold; their specific gravity, however, being rather less than that of copper (8·95), differs remarkably from that of the precious metal, the specific gravity of which, when pure, is as high as 19·5. From aluminium wire and foil the lighter weights used for chemical purposes may be advantageously made, since, occupying something like seven times the space of those of platinum, they are more easily adjusted and handled, and less likely to be lost. The finest aluminium wire, from its insignificant weight, advantageously serves to suspend from the beam of the balance, objects the specific gravity of which is being ascertained. MM. Collett, of Paris, have constructed a chemical balance, in which, not the beam only, but every part, down to the milled head by which the beam is released, is made of aluminium.

Home Correspondence.

MR. TAYLOR'S PAPER ON LABOURERS' COTTAGES.

SIR,—During the discussion after the paper I read upon the "Construction of Labourers' Cottages," I was reminded, very properly by the chairman, that I had better not reply until the discussion had ceased, and I have, therefore, followed the same good rule as regards the correspondence which has appeared in your *Journal*, and I will now, as I did then, very briefly reply, and particularly to the letter signed "Henry W. Reveley."

This gentleman, and many others, seem to have expected that I should have departed from the subject of my paper, and entered into the question of rents—whether freehold or leasehold—buildings for London—whether blocks or insulated—or, at the least, that I should have brought forward my own views on these matters. All of these I left to those gentlemen and others, who may have more time and opportunity, and who are, I have no doubt, more capable of enlightening the public upon these matters.

I had quite enough to do in what I proposed, viz., to give the result of my practical experience in the defects generally found in thin brick cottage walls, and other evils resulting from constructional defects, and to show the remedies which I had found successful, without the introduction of any new material, but simply by the novel adaptation of those generally in use, and I showed that, by my giving up all profits derivable as a patentee, these improvements could be used for labourers' cottages without additional expense, and, in many instances, with a considerable saving.

As to the patent laws, I have only to say that we must take all laws as we find them, and I, for one, have done so. I am not prepared to advocate the existing patent laws, as Mr. Reveley does, when he states that, as "no exclusive privilege can be obtained for the manufacturer of such common things as bricks and mortar, they are therefore produced at the lowest standard of quality that will command a sale." Again, "that when we wish to construct damp-proof buildings, resource must be had to some patented material or manufacture. There is clay in abundance all over this country fit for making non-absorbent bricks, but, unless some trickery be introduced into the manufacture, so as to acquire exclusive rights, no one will take up the business."

The reason why Mr. Reveley finds a good quality of material in a patented article is, I think, that the patentee takes care that no defect in quality shall injure the credit of his inventions. I quite agree with him that, "If bricks are to be kept in stock any time, it is found necessary to house them for fear of their melting away; and fine red bricks for facings are generally so soft that they are merely rubbed gently one upon the other to make them fit into their intended situations."

Now all this would be remedied if Mr. Reveley would show the brickmaker how profitably to make the bricks, and the builder to build the waterproof walling made of common bricks and mortar, which he has seen all over Italy; he will then most certainly have taken all the "wind out of my sails" in spite of the protection of the patent laws.

Meantime, I shall be most happy to show him churches and other buildings, particularly residential, also labourers' cottages now erecting with similar materials simplified and adapted for the purpose, and I have little doubt but that he will then become as warm an advocate as he now appears a deprecator. I am, &c.,

JOHN TAYLOR, JUN.,

53, Parliament-street, S.W.

MR. REVELEY'S TANKS.

SIR,—As a gas engineer, having had to make some hundreds of tanks in this and other countries (Italy included), I never yet found the man who could make a tank to contain 1,000 cubic feet of water—with only 4½ inches of brick-work—unless there was a thick layer of clay puddle under the bottom and round the sides, in which case the soundness has depended entirely upon the clay.

A circular tank 12 feet in diameter and 9 feet deep would

only contain 1,000 cubic feet, and although I am aware "There are more things in heaven and in earth than are dreamt of in my philosophy," yet I can scarcely subscribe to the possibility of making such a one, with only 4½ feet of brick-work, perfectly water-tight.

It is depth which tests the strength of a tank; but with several only 10 feet deep, and with as good materials as any in the world, the Italians have, so far as my experience has gone, made their walls 24-inch thick, where the soundness of the tank has depended entirely upon the wall; while in this country, where there is usually plenty of clay, the bottom half should be of 14-inch work, and the top in 9-inch, with 12 inches of clay on the bottom and round the sides, and even then, unless the puddling be done very carefully, the tank will not be perfectly sound. I am, &c.,

GEO. BOWER.

MR. HUNT'S PAPER ON MINES.

Sir,—It is to be regretted Mr. Hunt did not give a definition of what he meant by the term "science" of mining. If he intended to advocate the teaching of the igneous doctrine to working miners in preference to their own ideas, or he wished them to be "posted" in the ever-changing hypotheses of our modern geologists, and take them as their guides instead of their own daily experience, they would indeed have to delve like moles, in the dark, without rule or order, and legitimate mining would soon come to grief. Those who have no knowledge of mining, and hearing such lectures, may be persuaded that the "science" is now for the first time brought forth from the so called mining-school as a light to "the ignorant miners" who have hitherto laboured without knowledge. The sooner such a false impression is removed the better. The science of mining is far in advance of that taught in schools, or explained in ordinary lectures. It is quite evident that Dr. Collyer thinks that there can be no other science to guide miners than that assumed by speculative geologists. His letter in the last *Journal* is a perfect specimen of the kind of mining knowledge acquired in scientific schools. It is truly lamentable to think that so much valuable time and money should be wasted in listening to such strange and wild notions of the state of the earth as depicted in Dr. Collyer's letter. The idea that a crystalline compound is a proof of an igneous origin, when it is known that that compound contains upwards of 20 per cent. of water chemically combined, is, to say the least of it, most unwarrantable, and diametrically opposite to the facts and the senses. Happily our leading mine agents have a far better and more exact knowledge of the rocks and their contents than that indicated by geological writers, and have a safer principle to guide them in the selection of mining ground and its exploration than mere loose hypotheses.

When a survey is made with the object of legitimate mining, the intelligent and prudent miner first examines the character, composition, and structure of the ground, and seeks for the ordinary superficial metalliferous indication, in the same manner as a mineralogist would in investigating compounds of crystals, their forms, combinations, and contents.

The science of mineralogy does not require us to enter into the question of the origin of matter; no, it is confined to the immediate productions—their geometrical forms and their contents. A thorough practical man would not trouble himself how the granites, the gneiss, the slates, &c., were originally formed; he would deal with the actual facts and conditions, and draw his conclusions thereon. He would carefully examine the compositions and textures of the rocks; their configurations, ininternal structures, the angles, and magnetic bearings of the cleavage, fissures, cross-courses, the intersections of joints and clay-veins, &c., and form a judgment accordingly. Even in sedimentary beds we have almost infallible facts to guide us, especially in the metalliferous limestones.

In North Wales, for instance, we always find the lead-bearing bed situated immediately under the black-shale bed. In the North of England, all the lead-bearing beds and the unproductive ones are well known. We also knew the conditions in which the beds must be, and the bearings of the veins, &c., to favour the accumulations of large masses of ore. When all these conditions are carefully considered in connection with local variations, I unhesitatingly maintain that we can arrive at a correct conclusion as to the merits or the demerits of any given mineral ground in ten cases out of twelve, which is as near as we can expect in such a complicated subject.

It may be asked that, if this be true, how is it that so much capital is so often wasted in mining speculations, and why should miners be employed to seek for metals in rocks where they never find them in paying quantities?—Respectable mining agents are seldom responsible for such proceedings, they are generally undertaken by mere speculators; but if there be monied men taking a fancy now and then to search for treasures in barren rocks, let them do so; it is by means of such trials we get the negative evidences to prove the truth and the value of our "Science of Mining." I published a work under the title of "On the Connection of Geology and Terrestrial Magnetism," upwards of twenty years ago, in which our practical science of mining is explained, in connection with electro-magnetic actions, to which I must beg reference for further details.

In conclusion, I would recommend all who have an interest in mining, and who are desirous to learn the phenomena of mineral veins, to abstain from vague theories, and study the rocks and their containing minerals as they are seen in nature, and watch the operations of the laws by which they are governed and rendered productive for the use of man. I am, &c.,

EVAN HOPKINS, C.E., F.G.S.

15, Clarendon-gardens, Maida hill, W.,
January 6, 1863.

Proceedings of Institutions.

Worcestershire Union of Educational Institutes.—In the fifth annual report, laid before the fifth annual meeting of delegates, held at Worcester, the 13th November, 1862, the committee in the first place expressing that sorrow which (in common with all other societies established for scientific and educational purposes, and indeed with the nation at large) they have felt for the loss of H.R.H. the Prince Consort—alluding especially to the great benefits, direct and indirect, which he bestowed upon the cause of adult education—had also to lament the loss of a kind friend nearer home—one who always evinced a deep interest in the progress of the Union, as of all associations for the benefit of those among whom he lived—the late J. H. H. Foley, Esq., long a member of Parliament for the Eastern Division of the county. The committee tender their best thanks to H. F. Vernon, Esq., M.P., for a donation of £5; to those gentlemen who constitute the small body of annual subscribers; and especially to the donors of extra prizes, viz.:—The President of the Union; Right Hon. Lord Lyttelton; Hon. and Rev. W. H. Lyttelton; Sir Edmund A. H. Lechmere, Bart.; Rev. Dr. Williamson; and Rev. W. Lea. The subjoined statements show great progress in that department which the promoters have ever considered as the most important—the establishment of classes and the examination of candidates:—

	Institutes having Classes.	Pupils in Classes.
1858	8	342
1859	9	293
1860	10	697
1861	14	851
1862	20*	1,457

* Inclusive of night-schools.

Candidates in the examinations of the various kinds:—In 1859, 3; in 1860, 44; in 1861, 119; and in 1862, 260. This large increase in the number of candidates is mainly, if not entirely, to be attributed to the continued exertions so generously given by Mr. Marcus, of Bromsgrove, to whom the special thanks of the Union are again most justly due. The number of Institutes now in the Union is 25, with 5 night-schools; total number of members in the 20 Institutes being 3,460. The income of the 20 Institutes is £1,976 2s. 9d. The number of members shows a balance of increase of 211; and, with four exceptions only, the income of all the local Institutes has increased. During the past year more volumes than usual have been added to the libraries, though the number of books issued has diminished. A decrease is apparent in the number of female members, but at the same time it must be remembered that 15 females are amongst the candidates this year; that a girls' night-school is in Union; and that we are informed by the secretary of the Dudley Institute that the French class there is punctually attended by ladies. With regard to lectures, the engagements of Mr. D. Mackintosh and Mr. J. C. Buckmaster have, it is hoped, been satisfactory to the Institutes where they severally lectured. The former gave lectures at the Kidderminster Mutual Improvement Society, the Stourport Reading Institution, the Worcester Early Closing Association, the Dudley, Redditch, Ebley, Nailsworth, Stroud, Painswick, Bromsgrove, Pershore, Tenbury, Tewkesbury, Hanley Castle, and Stourbridge Associated Institutes. Mr. Buckmaster lectured at Dudley, Stourbridge, Lye, Worcester, Malvern, Droitwich, and Brimscombe. The committee would gladly have made an engagement with other lecturers, but they have been unable to come to any arrangement on account of the smallness of the funds at their disposal. They feel therefore most gaateful to those gentlemen who have given gratuitous lectures at the various Institutions in Union. Sixty-three paid and 103 unpaid lectures have been delivered during the past year, which is a small falling-off from previous years. Both the engagement of lecturers and the maintaining an interest in lectures seem a matter of serious difficulty in some Institutes. In some cases lectures are altogether given up from lack of support, in others the public are admitted without charge; and various means have been tried to make lectures more profitable both to members and Institutes. Sometimes a prize is offered at the end of the season for the best report of all the lectures which have been delivered; and this plan has been found to increase the interest of members in each lecture, and to impress the substance of them on their minds. The committee would also repeat the suggestion of last year, that "public readings" should be held. At Ipswich it has been found that penny readings have been more successful than free reading; so much so, that the sum of £132 was realised in that town after four series of readings. Four boxes of books have been circulated amongst various Institutions. The committee report with pleasure that more out-door and in-door recreation seems to have been provided by the various Institutes, and beg to congratulate the Bromsgrove Institution, Kidderminster Mutual Improvement Society, and Pershore Institute, on the success of their cricket clubs. The establishment of workmen's halls or club-rooms is worthy of the consideration of Institute committees. At Southampton three such halls are open at meal times, as well as in the evening. Games, newspapers, books, places for letter-writing, and refreshments are provided, and once a week public readings, singing, &c., are free to members, with their wives and families. The committee have been represented by the president at the annual meetings of the Society of Arts, the South Staffordshire, and the Southern Counties Unions, as well as at the Central Committee of Educational Unions, whose scheme of examinations for this season has been adopted by your committee, and is embodied in the Union Prize Scheme. The committee offer their congratulations to the Institutes of Evesham and Dudley on their energetic and successful efforts to obtain new buildings, and may perhaps be allowed to express the hope that other Institutes, whose operations are now cramped by want of suitable accommodation, may soon be enabled to follow those good examples. The report concludes by recording the gratitude of the committee to their honorary secretaries, the Rev. W. Walters and Mr. Josiah Jones, for their continued energy and zeal during the past year. Mr. Walters has been indefatigable in his exertions, both in conducting the greater part of the correspondence as secretary and also in his capacity as one of the examiners. Mr. Jones has again kindly allowed his house to be used as the office of the Union, and has also made successful efforts to aid the treasurer in recruiting the finances. The large balance of £32 was due to the treasurer at the commencement of the year, but now the funds are in a healthy state, and the debt has been cleared off. The Union is, however, still poor, and crippled in its operations, for want of greater pecuniary support, yet it has done and is doing much practical good, and it is in a state of solvency. The report of the organising master, for the year 1862, says that there has been a steadily increased desire on the part of Institutes in Union to avail themselves of his services; for whereas the number of Institutes visited in 1860 was only three, with 18 candidates, in 1861, eight, with 81 candidates, during the present year his labours have extended to 13 Institutes and night-schools, with 213 candidates. This most gratifying result may be ascribed to several causes. In the first place there is an increased desire on the part of managers to make such Institutions not only ostensibly but in reality Working Men's Colleges, not only or mainly places for intellectual recreation, but direct educational establishments, where the earnest seeker after knowledge, even though he may belong to the lowest section of the community, may obtain at a cheap rate, without having his lowly condition offensively kept in view, not only the common comforts of a well-lighted, well-warmed, well-ventilated, and comfortably-furnished room, and the fellowship of others like-minded to himself, but the use of books and apparatus of a direct educational tendency, and the services of philanthropic persons "apt to teach," and who, though moving in a higher walk of life, treat in a kind, conciliatory, and sympathising manner the honest sons of toil. The great increase in the number of candidates for elementary examination this year is also to be ascribed to the resolution passed at the last annual meeting of the Union, by which night-schools for either boys or girls may have the services of the organising master, and may compete for the prizes offered by the Union upon an annual payment of 5s. The organising master regrets to have to report that with the dissolution of the Worcester Working Man's Institute, the adult evening classes organised there for the benefit of the working classes generally of the city came to an end. Should the suggestion by the President of the Union, of a Combined Institute for the city, meet with acceptance, the organising master will have great pleasure in re-forming such classes. As regards educational appliances, the organising master recommends, as elementary reading-books for adult scholars, "Stories and Miscellaneous Reading for Evening Schools," a monthly magazine, published by Mozley, at 1d.; and for youths who may be more advanced, "Pleasant Hours," published at the same price by the National Society. For writing he cannot too strongly recommend Talbot's vertical writing sheets, published by T. Medlicote, Birmingham. The desks patented by Mr. Edwards, Camden-town, London, are most admirably adapted to adult evening classes, as they combine the three-fold purposes of desk, reserved seats for lectures, and tables. With respect to the course of work suitable for night-schools—as the scholars are for the most part unused to intellectual exertion, and meet only two or three times a week, and then but for one hour and a half, all the subjects of elementary instruction should, if possible, be in-

cluded in the evening's work. Some such an arrangement of time as the following is respectfully offered to the consideration of managers:—8·0 to 8·25 arithmetic; 8·25 to 8·50, writing; 8·50 to 9·10, reading; 9.10 to 9·30, dictation. By adopting such a course the three elementary subjects will be brought under notice, dictation supplementing both the writing and the reading lessons. The organising master's report closes with a reference to the recent regulations of the Committee of Council on Education, by which, doubtless a strong impetus will be given to the increase and more efficient working of night-schools.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. 1. Mr. J. A. Mann, "Ocean Currents on the N.E. Coast of S. America." 2. Captain Rowett, "Ocean Telegraphy." 3. Dr. G. C. Wallich, M.D., "Survey of the Natural Condition of the Atlantic, with special regard to Telegraphic Communication between Europe and America."
British Architects, 8.
Medical, 8½. Clinical Discussion. Mr. Bishop, "On the Artificial Hand of Signor Gallegos, and other cases."

Tues. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Mr. W. H. Preece, "On Railway Telegraphs, and the application of Electricity to the Signalling and Working of Trains."
Zoological, 9.
Syro-Egyptian, 7½.

Wed. ...Society of Arts, 8. Mr. Samuel Highley, "On Photography and the Magic Lantern Educationally considered."
Graphic, 8.
Microscopical, 8.
Literary Fund, 3.
Archæological Assoc., 8½. 1. Sir Henry Halford, Bart., "On the Proceedings of Charles I., from the storming of Leicester to the Battle of Naseby, Illustrated by Letters of Charles I." 2. Dr. Palmer, "On a Roman Villa at Marlstone, Berks, and Exhibition of the Antiquities found therein." 3. Mr. Syer Cuming, "On Ancient Brand-irons."

Thurs...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. 1. Prof. Oliver, "On *Loranthaceæ*." 2. Dr. Anderson, "On a New Species of *Aberia*." 3. Dr. Masters, "On the Germination of the Seeds in *Cyclamen*." 4. Mr. Lubbock, "On the Development of *Chloeon* (*Ephemera*) *Dionidiata*." 5. Mr. Adams, "On the Japanese Species of *Leiostruca*."
Numismatic, 7.
Chemical, 8. Dr. W. J. Russell, "On the Atomic Weights of Nickel and Cobalt."

Fri. ......Philological, 8.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, January* 2*nd*, 1862.]

Dated 6*th November*, 1862.

3003. F. Goodyear, Old Chan.e, St. Paul's—A machine for plaiting straw and such like material. (A com.)

Dated 20*th November*, 1862.

3123. J. W. Hjerpe, W. Holmgren, and A. V. Sunstedt, Stockholm, Sweden—An improved composition or preparation of materials applicable for igniting matches.

Dated 6*th December*, 1862.

3279. R. E. Donovan, Court Duffe, Dublin—Imp. in the means and apparatus for the prevention of railway accidents.

Dated 11*th December*, 1862.

3318. I. Spight, Glandford Briggs, Lincolnshire—Imp. in horse hoes.

Dated 12*th December*, 1862.

3330. J. Gaskell, Blackburn, Lancashire, and H. Walmsley, Great Harwood, near Blackburn—Imp. in regulating the tension of yarn in the process of warping, winding, sizing, weaving, and other similar purposes.

3332. A. Mills, Seaham Harbour, Durham—Imp. in reefing and unreefing, furling and unfurling sails of ships and other vessels, and an imp. in the rotary yards and the journals in which the sockets or ends of the rotary yards work.

Dated 15*th December*, 1862.

3345. M. J. Roberts, Pendarren-house, near Crickhowell, Brecon—Imp. in means and apparatus for preparing and spinning wool, cotton, and other fibrous substances.

Dated 18*th December*, 1862.

3385. E. Habel and E. Suckow, Manchester—Certain imp. in machinery or apparatus for preparing, spinning, and doubling cotton and other fibrous substances.

3389. J. Pernod, Avignon, France—A production derived from madders, called "Purpurine."

3390. J. Savory, Bond-street—A new or improved apparatus for the inhalation of medicinal powders or vapours for the treatment of diseases of the throat and lungs. (A com.)

3391. J. Longland, Landport, Hants—Imp. in street lamps.

3393. A. V. Newton, 66, Chancery-lane—Improved apparatus for transmitting power. (A com.)

3395. I. Holden, Bradford—Imp. in means or apparatus for washing wool and other fibres.

Dated 19*th December*, 1862.

3397. W. S. Longridge, Alderwasley Iron Works, Ambergate, Derbyshire—Imp. in machinery for rolling tyres, hoops, and rings.

3398. E. B. Wilson, 5, Parliament-street, Westminster—Imp. in machinery or apparatus for forging and pressing metals and other substances.

3400. A. V. Newton, 66, Chancery-lane—Improved machinery for attaching metal eyelets to cloth and other materials. (A com.)

Dated 20*th December*, 1862.

3402. J. B. Morrison, East Springfield, Ohio, U.S.—Imp. in washing machines. (A com.)

3404. A. T. Blakely, 24, Montpelier-square—Imp. in breech-loading ordnance.

3405. J. Nettleton, 34, Sloane-square, Chelsea—Imp. in stoves.

3407. J. Cowpe, Mill End, near Newchurch, Lancashire—Imp. in machinery for tearing, breaking up, and reducing rags, ropes, waste fabrics, and other similar fibrous materials.

3408. A. V. Newton, 66, Chancery lane—Imp. in the manufacture of automatic toy figures. (A com.)

3409. J. Platt and W. Richardson, Oldham—Imp. in scutchers or beaters of cotton, machinery applicable also to other machinery in which shafts are caused to revolve at high velocities.

Dated 22*nd December*, 1862.

3412. J. McLean, Broxburn, Linlithgow, N.B.—Improved apparatus or arrangements for obtaining oil and other products from shale and the like bituminous minerals.

3413. W. Francis, Burslem, Staffordshire—Improved apparatus for cutting soap.

3416. E. R. Dann, Nottingham—Imp. in goffering apparatus.

3417. R. A. Brooman, 166, Fleet-street—Imp. in stoves or apparatus for heating and drying. (A com.)

3419. J. B. Dalhoff, Copenhagen, Denmark—Imp. in cutting files, and in machinery to be employed for that purpose.

3420. C. Farrar, John-street, Horselydown, Surrey—Imp. in machinery or apparatus to be employed in treating certain fibrous materials.

Dated 23*rd December*, 1862.

3423. R. A. Brooman, 166, Fleet street—A new or improved colouring matter or dye. (A com.)

Patents Sealed.

[*From Gazette, January* 6*th*, 1862.]

January 6*th*.

1735. W. Lennan.
1957. T. Edwards.
1961. J. H. Johnson.
1962. C. B. Gruner.
1969. H. Wethered.
1974. H. S. Pontifex.
1975. J. Rhodes.
1977. H. Eschwege.
1980. T. Green and R. Mathers.
1984. E. Jaudeau.
1986. J. Mander.
1991. J. Leeming.
1994. J. H. Johnson.
1997. J. Waithman.
1999. J. Orr.
2000. J. Miller.
2001. W. Bliss.
2012. D. Bateman.
2013. H. Barber and H. de Garrs.
2014. W. E. Cochrane.
2016. G. Lowry.
2027. R. Ridley and J. G. Jones.
2035. T. G. Ghislin.
2054. J. R. Abbott.
2065. W. E. Newton.
2079. P. F. Cassegrain.
2091. A. C. Vautier.
2108. W. Clark.
2155. M. Henry.
2156. G. Noch.
2175. A. V. Newton.
2216. W. Clark.
2325. T. H. Falkiner.
2404. W. Upfill, W. Morton, and W. Asbury.
2569. J. Bouvet.
2951. J. G. Marshall.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, January* 6*th*, 1862.]

December 29*th*.

2993. W. E. Newton.
2997. H. Munster.

December 30*th*.

26. P. J. Worsley.

December 31*st*.

3000. J. Eason.

January 2*nd*.

121. B. Burrows.

January 3*rd*.

14. D. Bateman & S. Bateman.
25. J. Walls.
44. L. F. Perrier.
67. W. T. B. Allday.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, January* 6*th*, 1862.]

December 31*st*.

9. W. Bullough.
71. J. Ashworth, jun.

January 1*st*.

36. E. H. Bentall.

January 2*nd*.

27. J. Fowler, jun.
44. H. Bessemer.
356. H. Bessemer.

Journal of the Society of Arts.

FRIDAY, JANUARY 16, 1863.

SIXTH ORDINARY MEETING.

Wednesday, January 14, 1863.

The Sixth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 14th inst., the Hon. and Rev. Samuel Best, Member of Council, in the chair.

The following candidates were proposed for election as members of the Society :—

Blanchard, Mark Henry.	74, Blackfriars-road, S.
Burrell, Alexander	Gresham Club, E.C.
Challis, J. H.	35, St. James's-place, S.W.
Combe, James	(Jas. Combe and Co.), Belfast.
Duncan, Lieut. Francis, LL.D., &c.	Woolwich, S.E.
Fordham, Thomas.........	18, St. Mary's-ter., Westmoreland-place, Paddington, W.
Hoe, Richard March	New York.
Livingstone, A. S.	Adelaide-cottage, Carlton-road, Peckham, S.E.
Loveridge, Henry	Wolverhampton.
Lückes, Henry Richards.	Ross, Herefordshire.
Myddleton, David.........	Burton, near Lincoln.
Nicole, Adolphe............	14, Soho-square, W.
Pairpoint, Thomas Francis	7, Green-street, Leicester-square, W.C.
Ravaison, Walter	8, Richmond-buildings, Dean-street, Soho, W.
Robinson, John	Atlas Works, Manchester.
Sawyer, The Rev. Walter John	Belle Vue House, near Ross, Herefordshire.
Stenson, Joseph	Northampton.
Wadsworth, James	21, St. Symon's-street, Salford, Manchester.

And as Honorary Corresponding Member,

Macchi, Mauro, M.P. ...	Turin.

The following Candidates were balloted for and duly elected members of the Society :—

Bradley, John	129, Fore-street-hill, Exeter.
Duck, George N.	Blue House, Stockton-on-Tees
Gowland, Edward B. ...	1, Brecknock-street, Camden Town, N.W.
Hewlett, Alfred............	Haigh Colliery, near Wigan.
Lister, John	Shibden Hall, near Halifax.
McBride, Dr. Henry	Gilford, Co. Down, Ireland.
Mitchell, Wm. Lawrence	22, Richmond-street, S.
Noden, Edward Byron ...	Terrace House, Old Kent-road, S.E.
Robertson, Alexander ...	Holloway Mills, N.
Scott, Thomas	7, Randolph Cliff, Edinburgh
Scott, William	12, Westbourne place, Eaton-square, S.W.
Smyth, Samuel R...........	Dover.
Steinthal, G. A.............	14, Little Tower-street, E.C.

And as Honorary Corresponding Member,

Mairet, Sylvain	Locle, Switzerland.

The Paper read was—

THE APPLICATION OF PHOTOGRAPHY TO THE MAGIC LANTERN, EDUCATIONALLY CONSIDERED.

By Samuel Highley, F.G.S., F.C.S., &c.

It may seem strange (to some presumptuous) that anyone should wish a body like the Society of Arts to give an evening's consideration to that reminiscence of the nursery, the Galanty Show, to that toy of our boyhood, the Magic Lantern. Many scientific phenomena, when first discovered, either from their remarkability or beauty, have excited much interest in the popular mind, but have only been regarded by it as pleasing toys, till in the course of time their practical value has been discovered, and they have been ranked in the list of applied sciences.

Such was the globe of water, magnifying in distorted form the fly or flower, till in the hands of science it sprang into that exquisite refinement of optical knowledge, "the Microscope," that discoverer of hidden worlds and life, and the seat or form of disease within the inmost walls of the human frame. Such the Kaleidoscope, the tin case with its bits of coloured glass, regarded long only as a wonder from the fair, till in practical hands we find ourselves indebted to its aid for many of the beautiful geometric designs which ornament our walls or floors.

So likewise the Camera-obscura, the discovery of Baptista Porta, of Padua, till the progress of chemical knowledge revealed to us the means of fixing its fleeting images; and even then its products, together with its adjunct, the stereoscope, were little thought of in *their most valuable* practical bearings. Of late, however, this has rapidly impressed itself upon us, though we cannot as yet even see the limits of its Educational utility.

In Microscopy, Natural History, Physiological, and Pathological research, what an invaluable agent does Photography prove; for Nature here depicts herself with her own pencil, and, possibly, ere long from her own palette, *and in this resides* one of its greatest values, for *truthfulness* is insured, and our studies are delineated with a faithful and unbiassed hand; with what minuteness of detail, the photographs I shall exhibit will bear witness.

I trust that I shall be able to prove this evening, to many who may not previously have given attention to the subject, that the Magic Lantern is likewise, with attention, destined to become an instrument of great Educational value. We are most of us aware that Natural History designs have been produced by the ordinary Magic Lantern colourist, and many such subjects, even produced with care, have made us exclaim with Polonius that the representations have been, —— "very like a whale." Undoubtedly many subjects painted for the lantern are really artistic productions; but can the best artist for one moment pretend to cope with Dame Nature in her artistic moods? Can any artist (even a pre-Raphaelite) for one moment hope to introduce the amount of detail she, with her undulating brushes of light, fixes upon the film which her assistant the chemist, has prepared for her? For it must be borne in mind, that while the Artist delights in *broad effects*, the Naturalist regards *detail* as a *sine qua non*, their aims being different; and it must be patent to every one, that while the painted views we have long been accustomed to to meet every requirement, where mere amusement is concerned, photographic transparencies on glass will be the great means by which the Magic Lantern will be rendered subservient to the purposes of instruction.

Although many persons in private have employed photographs for the Magic Lantern, I believe that to Messrs. Negretti and Zambra the honour is due of having first produced for public sale subjects of geographical and artistic interest, specially prepared for the lantern; but I am not aware that any one besides myself has entered upon this branch of trade with special Educational aims. I have long been impressed with the conviction that the lecturer on Botany, Zoology, Microscopy, Geology, Astronomy, and even on Pathology, would welcome as a boon truthful transcripts of nature that could be packed in a

small space, and then shown on a scale to arrest attention in the student. This idea is actuated by no showman's feeling; for all persons who have had any experience in scientific educational matters know the value of appealing to the eye. Book knowledge, or that experience gained even from the most graphic descriptions, is of little value to the student who would become a true naturalist. He must see—if possible, handle—the objects of his study. The next best thing to this is to be familiar with the most accurate delineations of the forms he wishes to become acquainted with; and here photography offers her aid, and the magic lantern popularises her efforts.

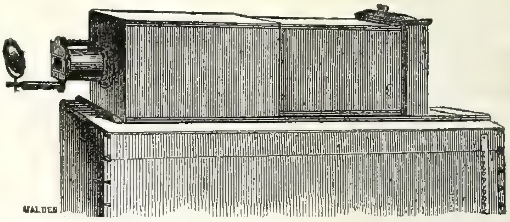
But the Naturalist is not the only favoured teacher: the Art-professor may likewise avail himself of these aids to education, and so may the teacher of literature. In high-pressure steam days like these, the student has enough to do to make himself familiar with all that he is expected to be acquainted with; and if he really meets all the requirements of the Board of Education Examiners, he ought to rank as the eighth wonder of the world. But, by the aid of Photography and the Magic Lantern (would that some more scientific, if not so familiar, a name for our instrument were recognised), teachers could kill two birds with one stone; for, while they were familiariaing their pupils with the peculiarities of style of eminent artists, they might simultaneously convey to them the leading features in the works of celebrated authors such artists had illustrated. Thus I shall presently show on the screen how Kaulbach's wonderful style and Goethe's bitter satire may be illustrated by the photographic illustrations to "Reynard the Fox." Again, how Hogarth and morality may be combined, in the counterparts of the celebrated engravings of the "Good and Idle Apprentices;" and how the great stories of the Bible may be illustrated simultaneously with dissertations on the bold and vigorous designs of Schnorr. I will also show how the singing-master may avail himself of our method, so as to place the words and music of a hymn, or other appropriate song, before a choir, when such subjects as Schnorr's Bible Pictures are being exhibited in the dark.

And now to the means by which we accomplish our purpose. In the first place, the negatives may be those of the usual character; but, if taken expressly for the lantern, it should be borne in mind that the pictures should be included within circles. Whenever it is possible the negatives should be taken from nature, animate or inanimate; but there are many cases where this is impossible, and when a diagramatic treatment of the subject is desirable. This specially holds good with many Oceanic forms of life; for, when out of a sufficient bulk of their native element, they collapse and look anything but "from the life."

Again, from the rarity of the subject desired, it may be necessary to resort to engravings; but no expense should be spared to procure them from the works of the best authorities, and in such a style of execution as is to be found in the works of Ray and Palæontographical Societies. If artistic, the negatives should always be taken from the originals, so that the characteristic touch of the artist may be ensured. Where negatives of microscopic objects have to be secured, we must adopt one of several arrangements that are founded on a common principle.

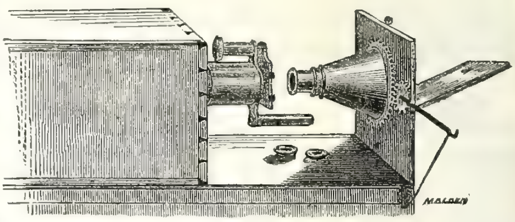
Negatives of microscopic objects may be produced by the method originally proposed by the late Mr. Joseph Delves, which simply consists of placing an ordinary microscope (from which the eye-piece has been removed) in connexion with a solid or bellows-bodied camera, having a focussing range of from two to four feet, or a solar microscope arrangement, fitted to the window of a darkened room, the room itself being used as a camera, as preferred by Mr. Wenham, or my own arrangement, which conduces to compactness of parts, and the optical portions being always in adjustment when required for use; or the arrangement of Dr. Maddox, who replaces the reflecting mirror with an Abraham's achromatised rectangular prism, and employes a Coddington lens for the condenser; or the arrangement of the Rev. W. T. Kingsley, who employs a very complex system of condensers, an achromatic eye-piece of peculiar form, the oxy-hydrogen light, and determines the position of the chemical focus by means of a fluorescent screen. If low powers are to be employed, a microscopic plane mirror collects the light, and reflects it through the object-glass on to the sensitised collodion film, as shown in fig. 1. If, however, the higher powers are to be used, it

FIG. 1.



is sometimes preferable to collect the sun's rays by a long plane mirror, mounted with a rackwork rotating support, and adjusting screws, so that it can be made to follow the sun's course, and the light so collected is condensed on to the object either as parallel or convergent rays; in the latter instance by means of achromatic lenses having the same angular aperture as the microscopic object-glass in use, as in fig. 2. As, however, all mi-

FIG. 2.



croscopic object-glasses are "over corrected," it is necessary to adopt some method for bringing the chemical image into focus on the film, after the visual focus has been determined on the greyed glass screen, and this is effected by aid of a micrometer head working on a screw attached to the stage (the parts being "keep up to their work" by means of a strong spring), the difference between the chemical and visual foci being determined experimentally for each object-glass for a given distance between the object and film; or, if great precision is desirable, special correction must be made for every object, for Dr. Maddox has found that the medium in which the object is mounted, its thickness, and the thickness of the cover, all have to be allowed for in securing perfection in the negative.

While, however, a considerable difference exists between the position of the chemical and visual foci in object glasses of low power, with the higher powers the difference is practically *nil*.

The great art in producing negatives of microscopic objects in the utmost perfection depends upon skill in the manipulation of the illuminating appliances, and I do not think anything has yet surpassed the photograph of Navicula angulata, produced in 1853 by the late Mr. Joseph Delves, a specimen of which (though, unfortunately, a faded one), is on the table. Negatives of microscopic objects may be produced by artificial sources of light, as the electric, oxy-hydrogen, camphine, napthalised gas, or photogenic pyrotechnic mixtures, as recommended by Wenham, and employed on a large scale by Moule.

AS TO THE PRODUCTION OF THE POSITIVES, OR TRANSPARENCIES ON GLASS.—Following the system of the Microscopic Society, we ought to adopt a standard guage for

our glasses, say three-and-a-half inches square for views for the general run of lanterns. The process—old structureless collodion, exposure in diffused light—the nearer it can be brought to a standard character the better. Iron development, after intensification with pyrogallic acid by Major Russell's process; fix with cyanide of potassium, varnish the picture to give transparency to the film, mount between two glasses; or the albumen process may be followed with advantage, especially for "superposition printing."

Where, however, lantern views are to be prepared for trade purposes, it is better to produce them by "Camera printing" from negatives of large size, for by this method the producer is enabled to supply views, larger or smaller than the standard size suggested, according to the special requirements of his customers, and greater definition or sharpness is likewise attainable. I have stated that the nearer we can bring the light employed for printing transparent positives to a standard character the better, for the operator would then attain to uniform results, and loss through failures would be greatly diminished. It is also desirable that the operator should be made independent of the sun's light, for after two season's experience I find that when the stock of views one has prepared during the summer months is carried off, at the time of demand, the winter months, through failing light, it is difficult, at times impossible, to meet the demand of would-be customers. To avoid this annoyance I have lately given my attention to the production of an artificial light, rich in actinic or photogenic rays, cheap in production, and that could be turned on or off as required, with what promise of success I will presently demonstrate.

It is true that we could use carbon points, or a fine stream of mercury, brought to a state of intense ignition by means of the electricity produced by forty Groves' cells, but both the ordinary electric light, and Way's mercurial electric light, are too costly in "the plant" to be economically considered. It is commonly believed and frequently stated in some of the photographic journals that the oxy-hydrogen light may be employed for photographic purposes, but the fact is, and I wish it to be distinctly understood, that though very brilliant and intense, it is peculiarly wanting in actinic rays. Sometime since my friend Mr. Charles Heisch was preparing a lecture on Photography, and wishing to give an illustration of the method of producing a picture, he thought he should be able to demonstrate the point by aid of the oxy-hydrogen light, but he found, experimentally, that while he could produce a sharp picture of a white bust, instantaneously, by the electric light, he could only obtain a dingy image of the same object after twenty minutes' exposure to the oxy-hydrogen light. It is well known that if an artificial light emits fluorescent rays (known by their peculiar effect on bodies possessed of the character called by physicists, "*Fluorescence*"), that light is also rich in actinic or photogenic rays. I shall now show how far the light I have been experimenting on is likely to prove of utility to photographers. [Mr. Highley here turned on from a gas-jet a bright violet sheet of flame that made an uranium glass brought into its presence glow like a gem.]

The cost of production is always a legitimate subject of discussion before this society, and I may therefore state that, taking into consideration the cost of production of negatives (our engraved plates, so to speak), the cost of making the existence of the subject known, in other words, the advertising charge, and the cost of producing the transparencies, photographic magic lantern views can be sold to the public for five shillings each, plain, and eight shillings and sixpence coloured, while the ordinary magic lantern pictures, which as I have previously stated cannot for one moment pretend to embody the same amount of detail or truthfulness of nature, sell at just double that price, that is to say, sixteen shillings coloured, if of the same size and pretensions to artistic excellence. On the other hand, it should be stated that photographs involve a slight extra expense in the apparatus required, for an oxy-calcium or oxy-hydrogen light and achromatic lenses are essential for their perfect exhibition.

As ordinary magic-lantern pictures are in main made up of patches of colour, they can be shown by lenses that do not require great optical perfection; as, however, photographs are made up of detail, if they are shown with lenses that are not achromatic, a fringe of colour will be apparent on every line, and this defect in the optical parts of the apparatus used in their exhibition, will tend to produce a blurred effect, in fact a picture wanting in definition.

But photographic magic-lantern views, even when not in use, may be made available for educational purposes; for I would suggest that, if they represent Natural History subjects, instead of stowing them away in boxes, they should be placed in the open cases of museums, &c., beside allied objects, care being taken that they are fixed at such an angle that light should be reflected through them, by aid of a piece of white paper placed behind the transparency—or by mounting the views in long frames backed with fine ground glass, they might serve as appropriate borders to the windows of a scientific institution.

To make our system perfect, it behoves the producer of photographic lantern views to consult the requirements of the curator or travelling lecturer, and make the demonstrative apparatus as compact and generally useful as possible. I have therefore given thought to these important points, and now beg to call your attention to some of the contrivanees I have introduced.

THE SOURCES OF LIGHT may be the electric lamp, which, from its intensity, is well suited for institutions or large lecture theatres; but for ordinary use it is too expensive, as it cannot be worked to advantage with less than forty of Groves' cells, and these, with a lamp, cost not less than thirty pounds (without a lantern). Some lamps, such as Serrin's, cost, *per se*, twenty pounds, but at the International Exhibition I exhibited a novel form of automatic electric lamp, founded on a galvanometer arrangement, the invention of Dr. Squire, which, when perfected, will be quite as efficient as those of our French neighbours, Dubosq and Serrin, and cheaper through there being a simplification of parts. A model of this lamp is on the table.

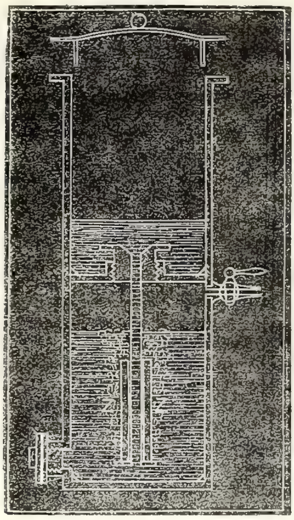
For general purposes the oxy-hydrogen light is most efficient, and as the pure hydrogen formerly employed is now usually replaced by ordinary house gas, the trouble is greatly diminished. Undoubtedly pure hydrogen gives a better light than the carburetted form, and when house gas is not attainable it may be best produced from a leaden generator constructed on the principle of Doebereiner's lamp. The vessel being divided into two compartments, the lower part is filled with sulphuric acid and water till it runs out at the tap; the tap is then closed, and the acid mixture acting upon a cylinder of zinc supported on the outside of a tube connecting the upper with the lower chamber, causes hydrogen to be generated, which, having no vent, forces the liquid up the tube into the upper chamber; as soon as the acid is removed from contact with the zinc, the production of gas ceases. On the tap being turned, the liquid descends and forces out the hydrogen with considerable pressure. The acid in coming in contact with the zinc again causes the gas to be generated, and thus, if the apparatus is properly constructed, the hydrogen is supplied under pressure and as fast as it consumed (Fig. 3).

The hydrogen may also be generated in a glass Woulfe's bottle, and be stored in a gasometer or gas bag till wanted, or common house gas may be passed into either of these receptacles, and expelled under any given pressure by means of weights.

Oxygen gas is readily and safely prepared by placing a mixture of two parts of small crystals of chlorate of potash to one part coarsely ground oxide of manganese, into a coni-

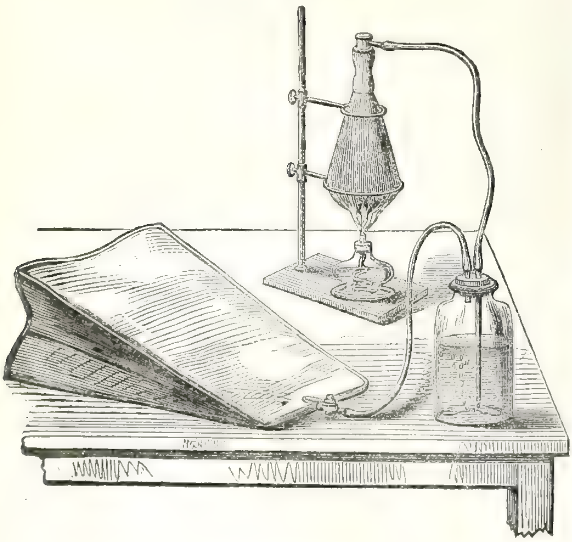
cal copper retort, which is then closed with a cap or safety valve of vulcanised india-rubber tubing, and connected with the long tube of a wash bottle, for the purpose of

Fig. 3.



freeing the gas from dusty particles or other impurities. The heat of a lamp is then applied, and as soon as the oxygen begins to issue from the short tube of the wash bottle, it is connected by a flexible tube with a wedge-shaped gas bag, as shown in Fig. 4, and so collected and stowed for use.

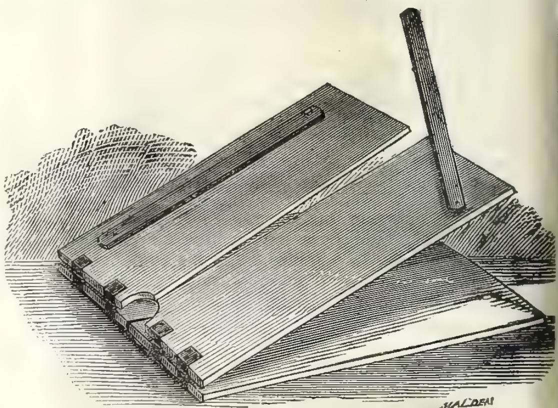
Fig. 4.



The bag of oxygen when wanted is placed between a pair of pressure boards; half-hundred weights are placed on the upper edge of the boards, and the gas is expelled at any desired amount of pressure.

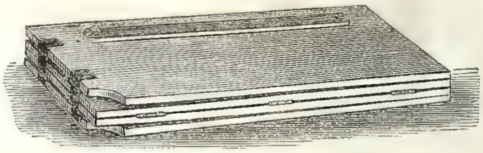
As the pressure boards, as ordinarily constructed, are of inconvenient size, I have adopted a suggestion of Mr. Malden, the engraver, a gentleman very conversant with philosophical instruments, and make them to fold up, so as to make packages of a more convenient form, the parts, when opened for use, being kept firm by clamps and swivel bars. The arrangement adopted will be readily understood by aid of Figs. 5 and 6.

Fig. 5.



PRESSURE BOARDS OPEN FOR USE.

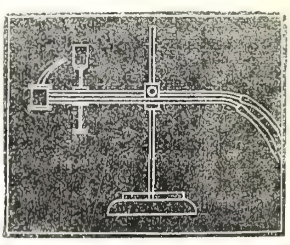
Fig. 6.



THE SAME FOLDED FOR TRAVELLING.

If both gases are to be used under pressure the connecting tubes of their respective bags are connected with the pipes of an oxy-hydrogen jet, Fig. 7, whence they are conveyed to a mixing chamber, from which the combined gases are projected upon a lime-ball placed at about one-eighth of an inch from the nozzle of the jet. The lime-ball is fixed upon a pin that is turned from time to time; or if the mixed gasses are to be used under greater pressure, the lime-ball is kept in constant rotation by means of clock-work, to prevent holes being burnt in the lime, and the light being thus thrown out of focus of the lenses, or the light being diminished in intensity through the distance between the jet and lime cylinder being increased beyond the proper point. The proper proportion of the oxygen to the hydrogen is regulated by stopcocks till the best effect is produced. If a picture only 10 feet in diameter

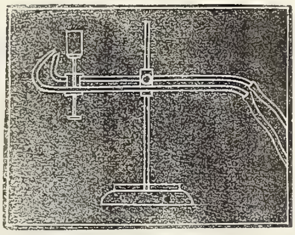
Fig. 7.



is to be produced, a very simple arrangement may be employed, a fine jet of oxygen is forced from a bag under moderate pressure through a flame of house gas burning at the end of a brass pipe connected by a flexible tube with

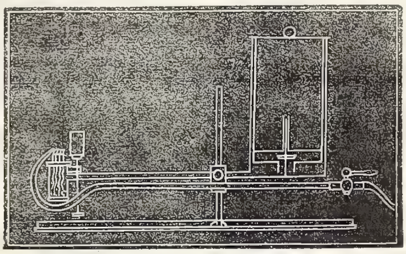
the burner of a lamp or other gas supply, Fig. 8, the mixed gases being projected on a lime cylinder, as in the previous arrangement, the incandescent lime being the real source of light.

Fig. 8.



When, however, house gas is not attainable, and the trouble of making pure hydrogen is an objection, a very good light may be obtained by forcing a fine jet of oxygen through a spirit flame on to a lime cylinder, by the arrangement shown in Fig. 9.

Fig. 9.

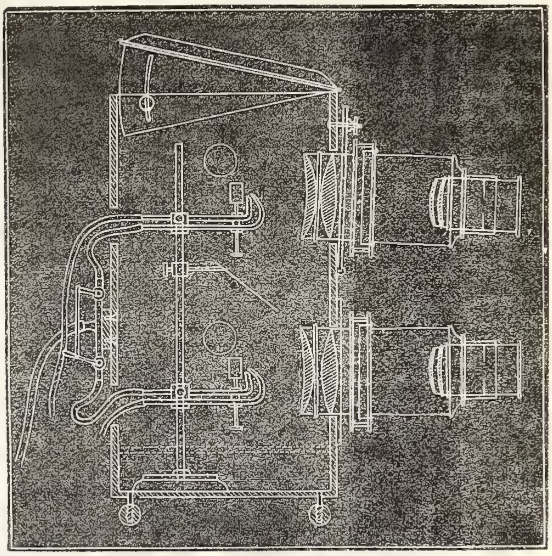


It should be stated that an argand oil lamp, even if the brilliancy of the light is increased by adding camphor to the oil, is not suitable for photographic views.

If the lime cylinders are to be subjected to a lengthened exposure, under great pressure, they must be made from the best and hardest lime; if under moderate pressure soft limes may be employed with advantage. Mr. Fryer, of Manchester, has proposed the employment of cylinders made of two parts of calcined magnesia to one part of sulphate of lime mixed with water, cast in a mould and then baked, which he states after careful photometric comparison, gives a light, as compared with ordinary limes, as 54 to 28; as far as I have tried this form of cylinder I cannot confirm this statement, but much may depend upon the details of preparation.

Lecturer's Demonstrating Lantern.—The best form of lantern for lecturers or institutions is one made in mahogany (the older the stuff of which it is constructed the better), twelve inches square and twenty inches high, fitted with two jets and two nozzles, the lower one being used for lantern views, the upper one is fixed on a hinged panel, so that if a dissolving view arrangement is desired, the two discs on the screen may be made to coincide by depressing the upper nozzle by the action of a spring and screw adjustment. The upper nozzle may be replaced by a microscope arrangement, or a polariscope, and to the flange of the lower nozzle various pieces, such as knife-edge slit plates may be fitted for Spectrum Analysis, or other optical experiments. To economise space and cost of production, in place of the ordinary chimney I use a flat dome of iron, fitted with side plates, so that by raising the dome or lid from behind, ventilation is secured, while the egress of light is prevented by the angular side-screens. Inside of the ordinary dissolving view fan, which I dispense with *in toto*, I make one view die away while the other brightens, by means of alternating gas-taps (that admit the oxygen supply), worked by a lever arm, all of which improvements are shown in section in Fig. 10.

Fig. 10.

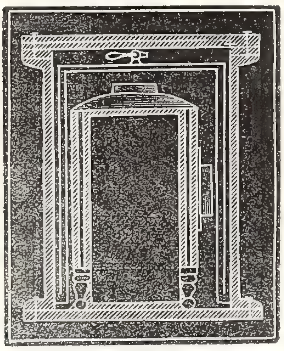


The optical parts consist of the condensers, which are formed of a meniscus and a crossed lens, and the front lenses, which should be achromatic combinations, adjustable by a tube sliding in a cloth-lined jacket, or by a rack and pinion motion.

The lenses should separate, so that while in combination they may give an obtused-angled dispersion to the rays of light, and then be used near a screen of moderate diameter, and when the back lens is removed, an acute-angled dispersion, so as to be suited for a large screen placed at a considerable distance from the lantern. By the latter arrangement, at an equal distance from the screen, a smaller, but consequently a brighter, picture is secured, as the same amount of light is not diffused over so large a surface as when the two combinations are used together.

If this lantern is to be employed by a travelling lecturer, I would suggest the adoption of an arrangement I exhibited at the International Exhibition, and which stands upon the floor; it consists of a zinc gasometer, enclosed in a wooden casing; within the body of the bell, the lantern is packed, while a case containing the jets, nozzles, &c., fits within the body of the lantern, as shown in Fig. 11.

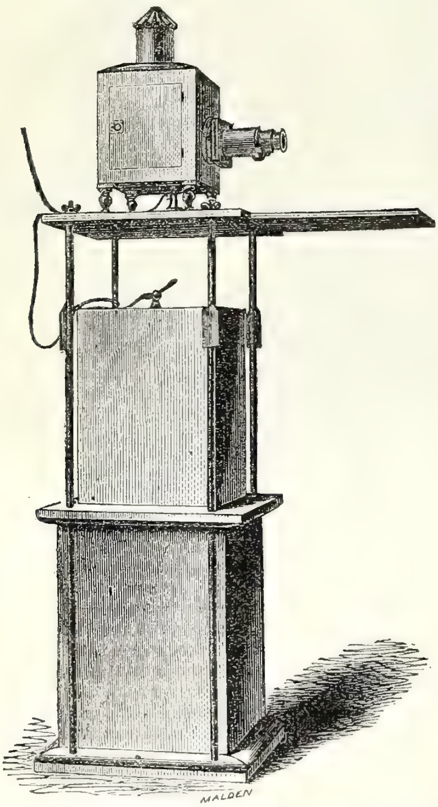
Fig. 11.



When the parts are unpacked four rods screw into the corner of the outer case of the gasometer, on to the top of these the folding lid clamps, and then forms a table for the lantern and slides as shown in Fig. 12, while the

bell of the gasometer is capable of holding sufficient oxygen for an hour's lecture (or longer).

Fig. 12.



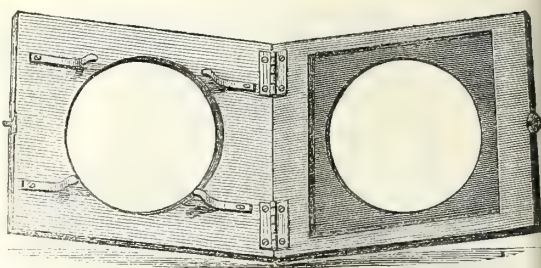
The lantern, case of fittings, and gasometer, when packed, occupy a space of 14 by 15 inches square by 24 inches in height. The four iron rods strap together as a separate package.

If, however, the lantern is to be in constant use at an Institution for demonstrations, pictorial or optical, then the lecture-room stand I have devised is more convenient. By rackwork and turn-table adjustments, the lantern placed on its stage can be centred with any piece of optical apparatus, or when required for views, it can, by a telescopic slide in the supporting bars, be carried up to the centre of a screen five or seven feet from the ground. By turning the folding flap back at any desired angle, and placing the lantern upon it, the rays of light might be projected upwards or downwards, as may be desired, according to the way the nozzle is placed in reference to the incline of the flap-table. I do not mount my photographs in separate frames, but, to economise space, pack them in grooved boxes like those used by photographers, and employ a pair of "view-holders." These open like a book, the slide is dropped into a square cell, and on the flap being shut and clamped by a turn-buckle of peculiar construction, the view is kept firm by four springs pressing on the corners, as shown in Fig. 13.

On a view-holder being taken from the lantern it is replaced by its fellow holder, and during the description of the subject on the screen it is opened, the previous slide removed from its cell, dropped into its groove in the stock-box, and replaced by the next subject, and the two view-holders are thus kept alternating.

With regard to screens, they may be transparent or opaque, the latter being distempered in "flatted" white by any method that prevents the surface from cracking when rolled up. Opaque screens can be made as large as

Fig. 13.



ten feet in diameter, and up to this size may be conveniently mounted, like library maps, in cornice rollers. Beyond this size, they should be constructed of calico sheeting, as they then fold into a small space for the purposes of carriage, and when mounted may be strained by strong poles jointed together like a fishing rod. The smaller screens may be supported and strained on a portable folding stand I have designed, a model of which is placed on the table.

The advantages I claim, then, for magic lantern views over those in general use, when Educational value is aimed at, are delineations truthful to nature and abounding in detail, cheapness, compactness, as compared with paper diagrams, and their utility in museums, when not in use for their legitimate purpose.

Beyond the department I have specially dwelt upon this evening, I may say a few words upon the Educational value of Stereographs, but only a few words, for every one must have felt their value, but unfortunately they have never been published in a systematic form so as to give them a true value for the purposes of scientific instruction, but if systematically produced the Schoolmaster, the Provincial Lecturer, and the Professor of Natural History, might bring many unique specimens, scattered through the museums of the world, within the ken of their pupils; in fact, the treasures of our British Museum might be carried in a Professor's coat pocket. Such productions ought to be accompanied by descriptive letter-press, and this leads me to the application of photography to book illustration.

I was one of the first—I believe *the* first—who applied photography in this direction, for in 1852 I illustrated a paper in the "Quarterly Journal of Microscopical Science," of which periodical I was the projector, and (at that time) proprietor, with an 8vo. page plate containing two enlarged photographs of microscopical objects, with the "imprints" exactly in counterpart of a lithographic, steel, or copper-plate print.

These two subjects were printed at one operation, on a single 8vo. page of albumenised paper, in such a manner as to avoid the consumption of time and expence over the usual process of "mounting," a matter of great importance when a thousand copies had to be in the binder's hands on a given day. I subsequently published a second book illustrated with photographic plates, viz., an English edition of Dr. Unger's beautiful work on the restoration of the fossil Flora and Fauna of the different geological epochs, bearing the title, "Ideal Views of the Primitive World."

Having had some experience in this direction, I feel bound to state that we can never look to the present method of producing photographic prints, if we wish to apply the art to the purposes of book-illustration, for the cost of each print is too great for popular educational adaptation; but there is a method to which I look with hope, viz., the photo-galvanographic process of Mr. Paul Pretsch. By this invention, the

counterpart of wood blocks can be produced from a photographic negative; and every publisher will, I think, back my assertion that this is the right and principle direction in which experiments should work; and I trust to see the day when Mr. Paul Pretsch's unwearied labours will, as they deserve to, be crowned with complete success. For every bee in the great hive of science should sympathise with the labours of his fellow bee, while deploring that the awards and honours of the land fall too often to the share of the drones. In conclusion, I would say that every Exploring Expedition should be accompanied by its official photographer; that every National Museum, Observatory, and Hospital should have its appointed operator; and then the hoped-for time may come, when we can, in systematic manner, place the Records of Scientific Travel, the Transcripts of Nature's Treasures, and the History of the Progress of fell Disease, upon the screens of our lecture theatres, the stereographs of our cabinets, and the pages of the books in our libraries.

DISCUSSION.

Mr. CHARLES JONES, as an old member of the Society, expressed the deep interest he felt in the subject which had been so ably brought before them this evening, and the pleasure with which he had listened to Mr. Highley's paper, and he congratulated the meeting upon the very practical manner in which that gentleman had treated the subject. Since the year 1859, he (Mr. Jones) had devoted a great deal of attention to photography in connection with the lantern, and the members would probably recollect that on two occasions at the Society's conversazioni he had exhibited a series of photographic transparencies in the lantern, showing its capabilities as an educational instrument. Amongst other subjects of a popular character, he had recently photographed the engravings given in the *Illustrated London News*, representing various incidents connected with the distress in Lancashire, and he should feel obliged to Mr. Highley if he would be kind enough to include a few of those photographs in the illustrations with which he was about to favour the meeting.

Mr. HIGHLEY said he should be most happy to do so.

The CHAIRMAN then suggested that he thought it would be more convenient that the illustrations should now be shown, and any further discussion upon the paper would take place afterwards.

Mr. HIGHLEY then exhibited, on a large screen, an extensive series of lantern views of scientific subjects, illustrative of the application of photography to the representation of geological, botanical, zoological, microscopical, astronomical, geographical, ethnological, biographical, and pathological subjects; and afterwards examples of the representations of the artistic works of Kaulbach, Schnorr, and Hogarth; together with groups of sculpture, as well as some specimens furnished by Mr. Charles Jones.

The CHAIRMAN said it was now his duty to recall the attention of the meeting to the subject which had been so ably brought forward in the paper, and to invite discussion upon it. After the illustrations they had just seen, he thought they would be better able to appreciate the paper which Mr. Highley had read.

Mr. PEARSALL thought the medical profession and society at large would be greatly benefited by the application of photography to the illustration of the various stages of the diseases of the human frame. He had frequently been called upon to make sketches of the progress of disease, but it was impossible for an artist to follow the rapid changes which sometimes took place in cases of a complicated character. In this respect, therefore, photography was of the greatest value. Its importance to the palæontologist was also manifested in the illustrations given of the restorations of extinct animals. With regard to the illustrations of the distress in Lancashire, he thought it was a remarkable proof of the perfection to which the art of wood engraving had been brought, that the subjects exhibited this evening bear the severe test of the high magnifying power to which they had been subjected in the lantern.

Mr. W. HAWES thought so interesting a paper as this ought not to pass over without a few more observations than had already been made upon it; for he thought very few would have had an idea of the importance of this subject in an educational point of view, had they not seen the illustrations which had been shown, and undoubtedly they would not have been in a positien to discuss the merits of the paper, or to appreciate the views enunciated in it, without first seeing the illustrations by which it had been accompanied. When they considered that photography itself as an art was scarcely a dozen years old—that it was only just previous to the Exhibition of 1851 that it was first practically applied; it was a striking illustration of the marvellous rapidity with which knowledge of all kinds was made available, and how soon it became popular and was turned to really useful account. It was only by the untiring industry of comparatively few persons, who had devoted themselves to the study and development of this new art, that it could have been brought to such perfection as to allow of the production of such beautiful specimens as had been exhibited this evening. He thought their educational value could hardly be over-estimated, and that those present were much indebted to Mr. Highley, not only for the paper itself, but for the illustrations of this beautiful art with which he had favoured them, and which showed the vast amount of benefit which would be derived from photography applied to educational purposes. He could not conceive anything more valuable to the lecturer and teacher than this power of reproducing the marvellous creations of Nature, and exhibiting them in the way they had seen this evening. He therefore hoped they would unanimously thank Mr. Highley for bringing this subject before them.

The CHAIRMAN said, before they adjourned he might be permitted, in the name of the meeting, to thank Mr. Highley for the interesting paper he had read, as well as for the illustrations of it he had given. As an educationist, a line which he (the chairman) had himself taken, he could not thank him too highly for the manner in which he had brought the subject before them, connecting it as he had done immediately with education. The microscopic illustrations exhibited had shown, in a remarkable manner, how the valuable sources of information opened up to us by that instrument might be popularised and rendered available for general instruction. As an educationist, he (the Chairman), would again thank Mr. Highley most heartily, for he thought they had arrived, happily, at the day when they did not regard education as a mere matter of form. The eye must be entertained, and they might in many ways contribute to education and enlarge the powers and faculties of the mind without treading merely those old and narrow paths to which education had been hitherto confined. The rule of thumb was no longer admissible as a simple means by which alone education could be conveyed; and any means by which science could be popularised was to every educationist in 1863 the most valuable assistance that could be given. He therefore looked upon photography as a means, and a most important one, by which opportunity would be afforded of enlarging and educating the minds of the people. He now begged, in the name of the meeting, to thank Mr. Highley both for his paper and for his beautiful illustrations.

Mr. Charles Jones exhibited some transparent and other stereoscopic views, and Mr. J. R. Lavanchy sent for exhibition a selection of photographs consisting of cartes de visite portraits, and portraits of dogs and horses by J. Delton and Cie., of Paris.

The Secretary announced that on Wednesday evening next, the 21st instant, a paper by Mr.

A. K. Isbister, M.A., "On Colonization and Convict Labour in the Hudson's Bay Territories," would be read.

AWARDS OF MERIT AT INTERNATIONAL EXHIBITIONS.

(*Continued from page* 133.)

In August last the Council of the Society of Arts issued a letter, inviting the opinion of the Jurors, the Commissioners for the Colonies and for Foreign countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and requesting replies to the questions given below, with the intention of embodying the answers in a public report.

AWARDS OF JURIES.

1.—Are you of opinion that Awards for Merit, by medals or otherwise, in International Exhibitions, are desirable?

2.—State the reasons for your opinion.

3.—Ought Works of Fine Art and Designs to be excluded from the awards?

4.—Can you suggest any better method than the appointment of jurors for making the awards?

5.—Can you suggest any improvement in the constitution or proceedings of the juries?

6.—Is any appeal from the decision of the juries desirable?

7.—If you think awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?

8.—Have you any further suggestions to offer on the subject?

The following is a summary of the replies received. The figures attached to the replies correspond with those of the questions*:—

MACLEA AND MARCH, Exhibitors, Class VII.—1. No. 2. The general belief is that exhibitors who have friends or relatives in the jury, have a favourable influence beyond those who have not, and who simply send their products and pay no further attention in the matter. Besides, the parties who are to be the future purchasers of any commodity shown, are quite as good judges as the individuals who compose the jury, and are more interested in forming a correct and unbiassed judgment, and of considering all the points which ought to be considered, before giving a preference to any one. The only safe way is to leave the public at free liberty to examine and judge for themselves.

M. H. MARSH, M.P., Commissioner for Queensland. 1. Yes. 2. Exhibitors like them, particularly foreigners. 3. There may be much difficulty in deciding, when it must necessarily be a matter of taste. 4. No. 5. No. 6. No. The opinion of the public is enough. 8. Would suggest that the reasons given by the juries should be made more full and specific; the public would thus have better means of deciding.

GEORGE MAW, F.S.A., Exhibitor, Class XA.—1. The reasons are so conflicting it is difficult to give an unqualified reply; but, on the whole, believes that awards must be admitted as a necessary evil. 2. Awards of merit add greatly to the general popular interest of exhibitions, add to the prestige of exhibitors, and, therefore, act as inducements to exhibit. Does not consider the awards of jurors, individually, of much value. Although the medals have generally been given to the best *fourth* of the objects exhibited, yet when a careful examination is made of any particular branch, it must be admitted they convey no particular significance. The impossibility of a sufficiently fine classification brings too great a diversity of objects under the notice of a single jury. Attempting to subclassify any particular class, so as to bring similar objects into relative consideration, presents the greatest difficulties; for instance, if the mere question of merit decides the awards, perhaps the whole of the medals available by a jury would be appropriated to a particular branch of manufacture which happens to be more fully represented in its class than another. Again, the different kinds of excellence, such as excellence of design, excellence of manufacture, novelty, or excellence of display, must always conflict in deciding the awards of a jury, and the unequal importance that different juries give to these various kinds of excellence must result in an apparent inconsistency. It is unwise to do away with all gradations in the character of awards. The award of a similar distinction to the best seven thousand objects places on a level those of widely different character, and must bring such awards into disrepute with many of the high class of exhibitors; thinks the "Council Medal," or some similar distinction, should be retained; that a rather larger proportion should be given than in 1851, say one to every four ordinary medals, or one to every 16 or 20 exhibitors. These would be distributed amongst the best thousand exhibitors who must care little for a lower award, which classifies them with their inferior competitors. Would propose that every object should be adjudicated upon under four distinct aspects, and an award made upon each separately. *a.* As to excellence of manufacture. *b.* As to excellence of design. *c.* As to originality or novelty. *d.* As to display in Exhibition. Qualification under any one aspect to be subject to the award of a medal, but only one medal to be given to the same object however many of the qualifications it may have passed, which would all be enumerated in expressing the award. In the recent report of awards these terms of qualification are all used, but to systematise them and make them uniform in the several classes would tend greatly to simplify the work of the jurors, and give a greater apparent consistency in their awards. *e.* Would limit the awards altogether to novel inventions or new applications of old processes. *f.* Would award the medals upon a fixed schedule competitive prizes offered in all the leading branches of industry, similar to the awards made at the Royal Agricultural and Horticultural Societies' exhibitions. 3. Awards should be limited to the industrial department of the exhibition, as awards to objects of high art would not be appreciated by exhibitors, and it would be impossible to make them on any definite system. 4. No. 5. Considers the present constitution of juries excellent, and everything that can be desired. 6. It would be found desirable to permit an appeal from the jurors' decisions, more with the object of satisfying unsuccessful competitors by the knowledge that an appeal is open to them, than with the idea that it will be often taken advantage of. Appeals, if admitted, should be made in as formal and systematic a manner as possible, on some distinct grounds, to be classified in a formal schedule by the commissioners. Awards, and the exact way in which they are expressed, should be made known privately to exhibitors before publication, to give them an opportunity of correcting clerical errors or errors of description and designation. A comparison of the first and second editions of the jurors' awards, 1862, will show the necessity of this. Is inclined to think that a mere difference of opinion between an exhibitor and the jury of his class should not be considered a sufficient ground of appeal, but an appeal on such points as, alleged insufficient tests of merit, clerical errors, errors of designation, &c., should be allowed. 8. In the 1862 Exhibition numbers

* In Mr. Lavanchy's answer to question 1, p. 131, col. 2, line 34 from bottom, for "No," read "Yes."—ED. *J. S. A.*

of exhibitors have been allotted space in different classes for the very same objects; it should be insisted on that every applicant for space in a particular class should state whether he has applied for space in any other class, and if it is found the several applications are for similar objects, he should be referred to the general superintendent of class committees, who would decide which of the applications should be cancelled. Much valuable space in the 1862 Exhibition has been wasted by duplicate sets of articles being exhibited in different classes, with the object of getting separate awards. Architectural pottery, sanitary ware, &c., should be made a sub-class of pottery, instead of being placed with civil engineering.

JOHN MERCER, F.R.S., F.C.S., Juror, Class XXIII.—1. No. 2. There is such equality in the articles that the jurors are often unable to determine which are the best and deserving of medals, but, as they are expected to give a proportionate quantity, their friends and acquaintances that may be supposed to have had an influence. 3. No; if medals are given at all, they are to be given for merit and excellence; but the jurors, finding such difficulty in determining which, above others, is the best, a friend in such cases has influence. 4. No. 5. No; in general they do their best, but in cases of such equality private friendship has considerable influence. 6. No; it would open a field for competition and contention which would fill the Exhibition with confusion, for to get a medal is looked on in a money value point of view, and used as such in the sale of the article. 7. Favourable mention—"Good," or "Excellent," is enough; too much would be improperly used.

GEORGE MITCHELL, Exhibitor, Class Xc.—1. Not under the present arrangements. 2. *a.* Medals can be bought indirectly. *b.* The gentlemen of the juries award medals to those who are customers, &c. *c.* Some of the jury have awarded themselves medals for their drawings, and those who executed the objects, for instance, see Class Xc., No. 2,427, no medal—No. 2,440 has a medal;—contrast the two. *d.* The man of genius is excluded, often because he has used all his means; then comes the agent, and receives the honour. 3, 4, and 5. Certainly not, as it is a gift of nature, which is cultivated by indomitable energy. There are a great number of noblemen of shrewd and impartial judgment, and gentlemen who have made their fortunes by their skill and tact, and retired; these two classes of men would be the men, in my opinion, to award the right men according to their merits. 6. Yes; but the time would be thrown away, as it would not be noticed. 8. If the awards had been left in the hands of the Commissioners and their superintendents, it would have given greater satisfaction than the present arrangements.

P. MÖLLER, Sweden, Juror, Class IIIA.—1. The answer of this question depends upon the understanding of the expression "but voulu," intended purpose. *a.* If by this is to be understood (as the question 7 seems to indicate) a public and honourable distinction of the most remarkable products at the international exhibitions, neither the medals nor the way in which they are awarded have fulfilled this purpose. *b.* But considering that the Council of Chairmen at the International Exhibition of 1862, by removing all gradations of medals and by pronouncing that medals are to be awarded for merit, without any distinction of degree, and without reference to competition between producers, have acted in a just and liberal way by also acknowledging that every kind of art and industry possesses a real and absolute value; and, as the medals distributed at the London Exhibition of 1862 were intended as rewards to producers who had shown, by their exhibits, that their products were excellent in their kind, I dare to answer the question in the affirmative. 2. The most remarkable products have not been rewarded, only products excellent in their kind; and it would have been as difficult as unjust to have picked out amongst these, certain articles, and stamped them to be of a still superior merit. Where excellence exists, no pre-excellence can be admitted.. By not making any gradations in the rewards (highly commended is only an encouragement), the bronze medal rises to the same value as a gold medal, and becomes, what it ought to be, a "medaille d'honneur." As such it has been received by the producers in my country. 3. No; the fine arts have already shown so great an influence on the development of industry, that beauty in form and taste in adorning are now, in many industrial branches, as much wanted and as indispensable as strength or utility; this will seem sufficient for not excluding the fine arts from the international exhibitions, even if they merely were to be considered as "expositions industrielles." 4. Every reward or public acknowledgment of merit which is to be considered as justly and well deserved, must be founded on a strict and accurate examination, and an impartial and conscientious judgment; I think an able and well composed jury to be best suitable for this purpose, and cannot construct any other industrial areopagus which will not, more or less, include the system of a jury. 5. The jurors have been nominated either by the governments or by the commissions of the different countries, and in some cases the commissions have been guided by the wishes or proposals of the exhibitors. More uniformity in the nominations of jurors ought to exist, and the nominations should be made in such a way as to ensure the jurors being members of an international and industrial court of justice, and not merely guards of the interests of their countrymen exhibitors. 6. Appeals from the decision of a jury for explanation to the council of chairmen ought not to be permitted, except in a case where the legalised and prescribed rules or formalities may be proved to have been omitted or misunderstood. If so, the case should be remitted to the jury. 7. However approving of the system in awarding premiums, adopted at the London Exhibition of this year, I propose, as a mode of making the public appreciate the most remarkable products, that the juries should add to their decisions more detailed notes or declarations about the rewarded articles, and especially about those which want such explanations in order to be fully understood and duly valued. 8. The time for the meeting of the jurors ought not, as this year, to be fixed immediately after the opening of the Exhibition, but to be postponed at least a month. It is known that the exhibits of several countries were neither arranged nor numbered, nor were the special catalogues, containing many articles not mentioned in the official, and several notices and explanations published before the lapse of that time. By this the jurors were detained and annoyed in their work, and, in some cases, obliged to hurry on to regain the lost time. It has happened that medals and honourable mentions, awarded by the jurors, have been omitted in the record of proceedings, and also that mistakes of lesser consequence have been made. To prevent this, it ought to be prescribed that the record of proceedings kept at the meetings of sections or classes should be read at the end of every meeting, and signed by the chairman and secretary. It ought also to be ruled that no awards were to be noted in the record if not decided in the presence of a certain number of jurors.

WORTLEY DE LA MORE, Commissioner for Turkey.—1. Oui. 2. Les récompenses honorifiques sont les seules qu'on puisse offrir avec avantage à l'industrie. Les petits industriels finissent toujours par en tirer un profit matériel. Les grands industriels y trouvent jouissance d'amour-propre, et ils ne craignent pas pour l'obtenir de faire des sacrifices d'argent qui font progresser l'industrie et tournent au profit de tous—de l'industrie en général, du commerce et des consommateurs, et de la richesse publique. Les récompenses honorifiques sont les seules qui puissent tenter la grande industrie. 3. Non. 4, 5. Non; mais la nomination du jury devrait être entourée de toutes les garanties possibles et de grande solemnité; et, s'il était possible, faire prêter serment devant Dieu et sur l'honneur aux membres du jury de ne juger que d'après la conviction de leur conscience et nullement sur la re-

commendation d'amis, &c., &c. Cela aurait peut-être pour résultat de diminuer le favoritisme qui est la plaie du jury tel qu'il est constitué maintenant. 6. Non; le jury doit être entouré de toute l'autorité et le respect possible.

Morewood and Rogers, Exhibitors, Class I.—1. From our experience we do *not* think that awards of merit by medals or otherwise in International Exhibitions are desirable. 2. Because it appears to us that those interested in particular branches of manufactures, and who are practically acquainted with them, take more pains in their investigations, and form more impartial and correct judgments as to the real and practical value of any new manufacture, than the jurors. 3. We think so. 4. No. 5. No. 6. No. 7. According to our experience the mere exhibition of articles in an International Exhibition, even though not publicly noticed in any other way whatever, is of great advantage, as the article exhibited attracts the attention of some practical men interested in that description of manufacture, and results in material benefit to the exhibitor, if there be real value in his new manufacture. 8. We have no further suggestion to offer except that we think that an International Exhibition of a more permanent character would be found of greater service to inventors than any awards.

James Morris, Commissioner for Mauritius.—1. In great International Exhibitions like those of 1851, 1855 (French), and 1862, medals are not the best means as rewards for merit; my reasons are the following. 2. In the first place, I beg to distinguish between Exhibitions; for what would be fit and proper as a reward of merit in a particular and special institution, as the Society of Arts for instance, would not be equally so in a universal exhibition, or representation of the *ensemble* of the genius, inventions, and industrial appliances of all nations. In the former, the exhibional element, either artistic, mechanical, or otherwise, is more individual than collective, and honour would be the grand aim of the exhibitor in most instances; in the latter, the commercial element predominating, it would be in a considerable degree subordinate to the mere feeling of honour, and introduce a feeling of profit and commercial notoriety with all its advantages. For the former, a medal is appropriate enough; for the latter, equally inappropriate, in my opinion. In special institutions, the means of rewarding merit, though large, are limited; one medal would therefore amply suit the aims of such institutions. But in an International Exhibition, where every grade and type of merit from the world at large is represented, if medals be given at all, they should be ordinated according to those various grades and types of merit; for it is illogical to give but one medal for such a vast variety of excellence as the present magnificent exhibition represents, as by this decision, the mere clever arranger is confounded with the most profound inventor, and *ad captandum* displays stand out in the same category of honourable appreciation as the greatest efforts of genius, the most elaborate productions of taste and skill, and the most useful and comprehensive appliances. A first and second medal, as in 1851, merely circumscribed but did not remedy this objection, and, moreover, led to great dissatisfaction. A single medal with an honourable mention, a subterfuge for a second medal, as in the present Exhibition, is equally a course of dissatisfaction, inasmuch as this demarcation of merit is too limited; but to apportion medals graduated *ad infinitum*, according to the various classes of merit, would be impossible and undesirable. For these reasons I consider, in so important and complex an instance as our present Exhibition, medals as awards for merit should not have been adopted. 3. Certainly not; one of the points of superiority of the present, over the former exhibition of 1851, consists in the splendid display of the works of Fine Art. As art is the great preceptor of nations, the most beautiful of all the links between the spiritual and the material, between intellect and nature, between man as a portion of the glorious material world and man as the representant of the Creator of the universe, towards whom his aspirations are continually ascending on the wings of art, be that art architecture, sculpture, painting, music, or poetry, to exclude from awards works of Fine Art and designs, would be to show a non-appreciation of one of the fairest domains of man's genius and intellect. For man does not live by locomotives and calculating machines alone; and the production of a Gibson, a Monti, a Millais, a Hart, a Maclise, *inter alios*, are as well worthy of the highest rewards as the most ingenious machine for the pleasurable milking of cows, or the most ambitiously arranged collection of children's toys. In fact, no distinction, so far as rewards and honours are concerned, can, or ought to be made between mechanical and artistic intellect, and the results, either useful or beautiful. They are each items, and items only, in the great whole of human power and genius, and ought not to be disassociated. 4. No. 5. The regulations and decisions regarding juries, as published by the Royal Commissioners, strike me as excellent in theory, bnt the results in practice do not appear to have been so satisfactory. This, I conceive, arose from too large a number of jurors and their associates, being in all 612 persons, 325 English, and 287 foreigners, without a sufficiently responsible head or chief, and consequently, without a sufficient unity of purpose and action. Had specifications, brief, but lucid, of the most important inventions, the newest combinations, &c., been furnished to the council of juries by the exhibitors themselves; and had each juror been furnished with a copy of such *resumé* appertaining to his speciality, I think many errors, and certainly many important omissions, might have been avoided. When I say "specifications," I do not mean a mere catalogue of the objects sent to the exhibition, but a summary of their points of usefulness, novelty, artistic combination, or otherwise, and the commercial advantages anticipated from them. Such a plan might have obviated any chance-work; it might also have prevented important objects from being passed over altogether, thus doing away with the necessity of explanatory remarks in prefaces to second editions of jury awards, or of the modifications therein made. 6. In reality such appeal would not be desirable; for to whom could such an appeal be made except to the general public, which, after all, will, by its approval, give the best and most lastiug test of excellenee. According to the constitution of the jury system of the Royal Commissioners, the possibility of such a thing as an appeal ought not to be. But circumstances have shown that some appeal, or at least some rectification of judgments given, would have been desirable. I consider that every objection might have been obviated had the awards not been made public until the Exhibition had much further advanced, or rather, until its conclusion. This would have afforded ample time and leisure for the reetification of errors, unavoidable, perhaps, but errors nevertheless. I do not see what other mechanism could be substituted for the jury scheme of the Royal Commissioners; a president of council, a special commissioner for juries, and the head juries, subdivided into sections, acting as a united body for the confirmation of awards. No better plan seems to me capable of being organised in order to insure accuracy and fairness. Had an appeal, according to restrictions laid down, been allowed, the president of the council, in my opinion, is the only person to whom such appeal could have been presented; had it been allowed, the errors of omission and commission might have been removed in the period elapsing between the first and second editions of the awards of jurors. The public would have applauded such a rectification; each exhibitor would have felt that full justice had been done to him; and, above all, it would have become clear that no acknowledged error had been allowed to remain uncorrected from any adherence to form or routine. 7. In place of awards, as represented

by medals and honourable mentions, I consider a *report* from the aggregate body of jurors, carefully and conscientiously drawn up, far more valuable, both in a commercial and artistic point of view, as a full recognition of excellence. Such a report, or analysis, as it were, of the excellence, and a *resumé* of the progress of the arts and sciences, as represented in the Exhibition, would, in my opinion, be a stronger stimulus to improvement, and a juster appreciation of merit, even commercially speaking, than any medal or honourable mention could effect. For in such a report each exhibitor could see the reasons in detail for his favourable position, while at the same time he could compare with his own successful position, the equally successful position of the other exhibitors. The degree of merit could be at once ascertained, which no medal can specify, inasmuch as one party gaining a medal, who places it in his window on his goods, or otherwise, is *primâ facie* presumable to have had as much right to such a medal as the most eminent inventor whose exhibited objects have been the products of patient and laborious study, and their results of the greatest advantage to the whole human race. As an antithesis illustrative of this position, I would mention the Toy Trophy, and the Calculating Machine of Mr. Babbage, or the Telegraphic Printing Apparatus of Siemens and Halske, their Voltaic Induction Coils, &c. Besides, from such a report each exhibitor, honourably distinguished, could extract what applied to himself and publish it, as an incontrovertible proof of his excellence, in any way he pleased; this printed testimony of the jury, the *élite* of all most celebrated in each speciality, would be far more impressive and specific than any medal, and the correctness of the extract could at any time be verified by an inspection of the report. A copy of such report might be presented to the exhibitors, with any amount of formality, at the end of the Exhibition.

John Moseley and Son, Exhibitors, Class XXXIIb.—1. No. 2. Because the experiments have proved that it is difficult to elect qualified and impartial judges. 3. Not if awards are given at all. 4. If awards be given a better judgment may be obtained by electing one judge only in each class. Candidates for the office to be nominated by the exhibitors in the several classes, and the judge to be elected by exhibitors voting by ballot. 5. None occurs to us. 6. Yes; as at present constituted. 7. A critic might be elected by exhibitors in each class, who would be furnished by them with whatever information they might think desirable. He would then, shortly after the opening of the Exhibition, commence publishing the reports in a special daily penny paper to be published by the Commissioners, a portion of the reports from each reporter being inserted daily. The said paper being open to a limited extent to the correspondence of exhibitors. 8. It should be made known that the present awards are considered without value as criteria of merit. Would suggest the importance of the judge in each class being sworn to give the verdict according to the best of his judgment and belief. A ceremonial for the purpose of impressing the importance of their doing so would be desirable.

William Muir (William Muir and Co.), Exhibitors, Class VIIb.—1. Much more satisfactory both to exhibitors and, in the end, to the general public, that there be awards by medals or otherwise. 2. The object of exhibitors is mainly to call attention of the public to the special article of their manufacture, and thus to receive public recognition. In so doing they lay them before those who have a direct interest in the value of their productions, and who may be presumed to be the best judges of them. Articles left to the decision of the public and the purchasers are much more likely to have their real value recognised than by means of medals indiscriminately awarded by juries, no matter how constituted. This is the experience of almost all exhibitors in the exhibitions hitherto. Those of 1851–1855, and the present one of 1862, have given general dissatisfaction. 3. There ought to be no exceptions in favour of any article whatever. 4. Does not see how any different constitution of juries would obviate the difficulty. 5. Objection is to juries at all, but can suggest no better court of appeal than the general public. 7. Periodical exhibitions are desirable, and can suggest no better means whereby meritorious productions can be brought under public notice. Takes exception only to the indiscriminate awarding of medals or other prizes by juries who are often composed, and necessarily so, of men themselves exhibitors, rivals in trade or otherwise as successful inventors, manufacturers, and others connected with trade, who are very jealous of their dependents rising and gaining admission into their ranks. This, rightly or wrongly, is almost certain to give dissatisfaction; whilst the unbiassed judgment of the public, and of those who are in want of the article submitted, is all that is wished or sought for. The Patent Laws are a means to the same end, and might be made still more efficient were they so simplified as to bring them within the reach of, and secure to, the meritorious operatives especially, the fruits of their ingenuity and industry. 8. In the management and arrangement of the details of Exhibitions, care should be taken that they are left as much as posisible in the hands of intending exhibitors, and that as little as possible of the official element be employed in connection with them.

Eliezer Nash (Butler, Nash, and Co.), Member of the Society of Arts. Is not an exhibitor.—1 and 2. Awards for merit are not desirable. *a.* Because they cannot stimulate to excellence in invention or manufacture, which are intrinsically the products of mind and persevering energy, the evolution of these qualities being a much greater stimulant than any extraneous excitement. *b.* Because awards of medals, &c., are invidious expressions of disapprobation of the products of a very large number of Exhibitors who should be considered to have done well, as no individual can contribute to the aggregate collection of a great International Exhibition without having incurred an expense and labour sufficient to guarantee integrity of purpose. *c.* Because the awards can only in a few cases be made in favour of the persons who alone have the legitimate right to them as being the inventors, designers, or makers of the works on which the award is made, for most of the exhibits are by the purchasers of such works. *d.* Because such awards are commonly applied to a puffing system of advertisement, tending to deceive and mislead the public, who accept the exposition of a jury's award as an indication of excellence. Gives an instance of this. *e.* The difficulties of obtaining competent and impartial jurors so great that no standard of excellence can be based upon the awards. 3. Cannot see why works of fine art designs should be excluded; the reason No. 4 does not apply to such works with so much force as to general manufactures. 5. No exhibitor should be permitted to be juror, and the Commissioners of the present Exhibition appear also to think the same, as they have made every juror disqualified to receive a medal; but does not that disqualification, in connection with the greater honour of being selected as a juror, confer a greater reward upon such juror, with all its consequences, and the objections as above in reason No. 4. 6. An appeal from the decisions of juries not desirable, because such appeal could only only be made to umpires similarly selected, and would open up an endless discussion without satisfactory results. But thinks it would be well to allow juries to reconsider their decisions in cases of doubt and difficulty.

Newton and Company, Exhibitors, Class XIII.—1. Very undesirable. 2. Because it is simply impossible to decide on the merits of the majority of articles exhibited by merely looking at them, and, as a rule, they cannot be otherwise tested. There seems to have been no kind of principle on which they were awarded, sometimes the inventor, sometimes the manufacturer, and at others the retailer, getting a medal. 3. A more correct

judgment could be arrived at on designs than in complicated machines. 4. Very difficult to get jurors who understand the subject, not connected in some way with the exhibitors. 5. Impossible for juries to come to anything like a correct judgment without seeing the exhibitor to explain. In many instances they were invited to do so; whilst other exhibitors in the same classes were not allowed even after requesting. 7 and 8. Perfectly satisfied to exhibit, and leave the public to be the judges; it is quite reward enough for an exhibitor to be allowed to display his articles if they are good. This would almost entirely do away with the present universal dissatisfaction, and would not deter one exhibitor from sending.

JOHN A. OWEN, Juror, Class XXVIB.—1. Yes. 2. It gives great impetus to excellence in inventions and workmanship, the universality of competition leads to the production of much good. 3. No reason for excluding them. 4. No. 5. As far as possible exhibitors ought to be equally represented, and should have a voice in the appointment of the jury. 6. Not if constituted as suggested in No. 5. The jury, being selected from men of experience and high standing, would always listen to respectful complaints, having the power of calling in an associate or expert in case of doubt, and this should be final. Dissatisfaction is sure to arise in many cases, and, if encouraged, would lead to endless trouble. 8. Suggests that each medal should represent a preference for the time being only. No medal of honourable distinction of anterior date should be placed by exhibitors in any case. Parties infringing these rules mislead the public, and should be subject to restraint. Jurors should receive a token indicating their sacrifice of competition and their services rendered.

Sir THOMAS PHILLIPS, Vice-President of the Society of Arts, Chairman of the Council, and Chairman of the Jury, Class XXXVI.—1. Yes. 2. If bestowed with judgment, they afford the appropriate recognition of valuable inventions, of excellence in design or workmanship, and of improvement in taste, or in the adaptation of means to ends in works of industry. They are also much desired by exhibitors; and serve to encourage the exhibition, and, what is more important, the production of works of a meritorious character. 3. Works of fine art should be excluded from, but industrial design should be included in, such awards. 4. No, provided care be taken to ensure the appointment of suitable persons. 5. Knows nothing of the proceedings of juries generally, but the jury on which the writer served caused notice of their visits to be given to the exhibitors, in order to afford them an opportunity of bringing under the notice of the jurors the merits of the articles they exhibited; they met from time to time to compare and record their impressions; and at the close of their proceedings their decisions were read over, and their awards signed by the chairman. In order to give value to the reports of the jury, the reporter should be named by the commissioners instead of being chosen by the jury, in order to ensure the selection of a person thoroughly conversant with the subjects to be considered by the jury. Where exhibitors do not manufacture, they ought to lay before the jury an explanation of the grounds on which they rest their claim to a reward. The jury should also define accurately the articles for which their rewards are given, and the description of merit intended to be rewarded. 6. The Council of Chairmen constitutes an appropriate tribunal for ensuring uniformity of action and settling the rules by which the proceedings of juries should be guided; but an appeal would not be desirable from the decisions of juries to another tribunal on the merits of the articles exhibited. Thinks that exhibitors should be made acquainted with the awards before they are submitted to the Council of Chairmen, and should be entitled to bring under the notice of the jury merit or excellence which appears to the exhibitor to have been overlooked, and thus afford to juries an opportunity to reconsider their decisions. 8. Improvements might have been made in classifying the articles exhibited, and care in this respect is essential to the satisfactory discharge of the duties of juries. Many articles were included in the class for which the writer served which were not intended for that class, and some of those proper to the class were included in other classes; and has reason to believe that from these circumstances some articles were not inspected by any jury.

PHILLIPS and Co., Exhibitors, Class IIIB.—1. Very objectionable. 2. Because it gives undue advantage to the possessor of the medal, the public being ignorant of the reason why the medal was given, and because it is stated by the secretary of juries that "the medals do not represent comparative excellence or competition between individual exhibitors." 3. Yes; see No. 7. 4. No; see No. 7. 5. No; see No. 7. 6. Yes, because of the almost impossibility of juries having full information of all the circumstances connected with each exhibitor's productions. 7. Think juries should make a report on each exhibitor's productions; that the report should be open for the inspection of exhibitors for a certain time; and that each exhibitor should be invited to represent any circumstances in connection with his exhibit in which the jury appear deficient in knowledge or are acting under misapprehension, the jury then to revise their decisions before publication. This would ensure that each exhibitor's samples, &c., had been examined, notoriously not the case with the present exhibition.

(To be continued.)

Home Correspondence.

MR. HUNT'S PAPER ON MINES.

SIR,—I must beg your indulgence in order to correct a misapprehension which may exist with some of your readers, in consequence of certain expressions made use of by Mr. Hopkins in reference to my former communication. He says, "It is quite evident that Dr. Collyer thinks that there can be no other science to guide miners than that assumed by speculative geologists. His letter in the last *Journal* is a perfect specimen of the kind of mining knowledge acquired in the scientific schools. It is truly lamentable that so much valuable time and money should be wasted in listening to such strange and wild notions of the state of the earth as depicted in Dr. Collyer's letter. The idea that a crystalline compound is a proof of igneous origin, when it is known that that compound contains 20 per cent. of water chemically combined, is, to say the least of it, most unaccountable and diametrically opposed to the facts and the senses."

I have quoted this in *extenso*, in order to show how "strange and wild" has been the forced interpretation of my letter by Mr. Hopkins.

That all the mineral substances which compose the earth's crust do assume a crystalline form on cooling from the liquid to the solid state, is a fact so patent, that it seems an insult to common sense to repeat it. There is not a single exception in the whole mineral kingdom. Does Mr. Hopkins seriously intend to convey to the readers of a scientific journal, that all the granites, syenites, porphyries, the metamorphic series of rocks, quartz, fluor spar, rock crystal, limestone, chalk, marble, or even chloride of sodium, contain water chemically combined to the extent of 20 per cent.?

If not, what is the meaning of his language?

That the hypothesis advanced by me was "strange and wild"—in Mr. Hopkins's opinion—is not to be wondered at—for he actually refers to his own work "published upwards of twenty years ago, under the title of "The Connection of Geology and Terrestrial Magnetism, in which the practical science of mining as explained in connection with electro-magnetic actions." I must plead ignorance of its existence. Imagine a work published up-

wards of twenty years ago on the electro-magnetic action of mining. No subject with which we are acquainted has made such progressive strides within the last ten years as electro-magnetism—it is quite a new field of inquiry and research—even our present information is extremely limited. To thus refer your readers to such a purely speculative work on practical mining as indicated by the electro-magnetic currents of the earth, and that published twenty years ago! Would he like consulting the cosmogony of the Chaldeans and Egyptians during their early dynasties relative to the earth's structure.

The whole tenor of my communication was directly the reverse of that misconstrued by Mr. Hopkins. I directly stated, that no amount of scientific knowledge would of itself, except accompanied by practical information, be of essential service to the miner.

Yours, &c.,
ROBERT H. COLLYER, M.D., F.C.S.
Beta-house, 8, Alpha-road, January 12th, 1863.

THE JURY REPORTS.—EDUCATION AND CLASS XXXI.

Sir,—The purchasers of the volume of "Jury Reports" will probably be somewhat surprised to find, under the head "Class XXXI., Iron and General Hardware," a very elaborate and lengthy dissertation, not only upon the social condition of the labouring classes generally, but also on the whole subject of public education at home and abroad. Since the publication of these reports is undertaken by the Society of Arts, I know no other channel than its *Journal* through which I can so properly convey to the public the few words which seem to me to be necessary in reference to this remarkable document.

Let me at once say, to avoid misunderstanding, that the accident of my being the reporter of the jury of Class XXIX. (Educational Works and Appliances), has no connection whatever with the fact of my writing this letter. The report which I prepared for that class does not in any way come into competition with that of Mr. Alfred Tylor, the reporter of Class XXXI. It scarcely touches the same subject. It confines itself strictly to facts and figures respecting public education, and to those general conclusions which had the sanction of my colleagues. It does not propose to discuss the many topics of controversy which are treated in the report of Class XXXI., or even to express opinions on them. It is therefore simply as one of the general public interested in education, and not in any way as a rival reporter, that I desire to avail myself of your pages.

In that portion of the report of Class XXXI. which relates to public education, assertions are repeatedly made which amount in substance to this:—

1. That all Government interference with education is mischievous; and "that the whole of the money paid by the State is thrown away, there being no result for it."

2. That the whole of the present apparatus for primary instruction in England—training colleges, pupil-teachers, examinations, inspection, certificates, &c.—has utterly failed to do its work, and only tends to promote "sham teaching and sham learning."

3. That the only education worthy the name, is given in Sunday-schools, Mechanics' Institutions, and certain voluntary institutions, especially the King's College evening classes.

4. That the true solution of our educational difficulties will be, to leave the whole matter to the parents, who are the best judges of what their children want; and who would select better teachers and insist on better instructions if they were not meddled with and superseded by Government, school committees, and "educationists."

These propositions will be sufficiently startling to most persons who have studied, with any care, the state of popular instruction in our own country, or, indeed, in any civilised country in the world, during the last few years. Such persons will look with interest for the facts and arguments by which these propositions are sustained in a document which is to be published and circulated with an official character, which enjoys the combined sanction of the Jury of Iron and Hardware, the Royal Commissioners, and the Society of Arts, and of which it is expressly stated that:—"Arrangements have been made for the translation of this report by members of the jury. The names of translators, and the title and place of publication may be learnt by application to Messrs. Bell and Daldy." I will therefore venture to point out a few special examples of the way in which the great subject of National Education is treated in this report.

It is well known that the Royal Commissioners, in their report on Popular Education, recorded their conviction that the results of the present system were not entirely satisfactory. Their language is, "Only about one-fourth of the boys attain the highest class, and are considered by the inspectors to be successfully educated." This statement is qualified afterwards by another:—"Their religious and moral influence appears to be very great, much greater than even their intellectual influence. A set of good schools civilises a whole neighbourhood. The most important function of the schools is that which they best perform." Again, "the effort has been directed towards establishing a good type of education; towards the quality of the teaching rather than the number of the taught. In this point it has succeeded." [Report of the Commissioners, p. 273]. Throughout the whole report the strongest testimony is repeatedly borne to the great superiority of the inspected over the uninspected schools, and of the trained and certificated teachers over others. The fact that a large number of children quit even the best public schools before they can be pronounced to be "successfully educated," is accounted for partly by the early age at which the pupils are withdrawn from school altogether, partly by the frequent and capricious removals from school to school, and partly by certain defects and tendencies in the system for which the Commissioners suggest a remedy.

Now, it is curious to see the use which Mr. Tylor makes of the Commissioners' report. He is very anxious to prove that the whole system of school inspection, of government grants, and of training teachers has proved a failure. In criticising the schools under government inspection as distinguished from other elementary schools, he says, "The Commissioners' reports prove that only one child out of four gets an education." "The sum paid for each child at school is about 8d. per week throughout England. The sum actually paid by the fees is about 2d. per week, the difference of 6d. per week being made up from other sources, or, as only one child of four is properly taught, the payment is calculated for work done, then the parents (whose children are not taught) pay twopence each, and get little or nothing in return, and the successful child receives eight pennyworth of education for twopence. That is to say, for the teaching of each child, the parents pay only twopence, but if the number of children properly taught is made the divisor of the sum spent in the schools, then the dividend is 2s. 8d., which really represents the cost of the work done per week per child. The whole of the money (sixpence per week for each child in school), made up from other sources is lost, except that the children during school hours have been kept in a nice room during five or six hours a day, and out of their parents' way, and out of mischief."

Such is the interpretation put upon the Commissioners' statement. That statement is actually supposed to mean that three-quarters of the children are overlooked and permitted to remain idle, while one in four is selected to receive an education. Throughout the whole report the same curious hypothesis is assumed; and the "government system," as it is called, is everywhere contemptuously referred to by the writer as a "failure." But it is evident that the language of the Royal Commissioners affords not the smallest ground for such an assumption, and that even if true, it applies far less to the schools under government inspection, than to those voluntary and

self-supporting schools for the poor, by which the reporter would like to supersede them.

Another example of mis-statement occurs in connection with evening schools. Mr. Tylor, like every other sincere lover of education, attaches great importance to these institutions, and desires to see them multiplied. But his dislike to the measures of the Committee of Council is so great as to betray him into making this statement :—

" Unfortunately, although in most cases the master of a day school teaches two or three hours in the evening, his class is confined to the two or three pupil-teachers he is paid by government for teaching, and the children sent early to labour have no admittance, except in a few cases, to evening schools, and must trust to private tuition, or the help of their neighbours, until they are of an age to attend Mechanics' Institutions."

The simple facts are :—1. That the Government does not, under the present law, pay masters at all for teaching pupil-teachers. 2. That it does make special arrangements for the instruction of those young persons as part of the evening-school work ; and, 3. That evening schools are expressly encouraged and provided for in the Code of Regulations, attendance being counted for them as for day pupils, and grants of money being obtainable in respect of all evening scholars who are able to give evidence of their having been well instructed. These facts might easily have been ascertained, and it is to be regretted that they have been not only overlooked but contradicted in this official report.

Here is another sentence which, by the mode in which it deals with opinions and assumptions as if they were facts, is very characteristic of the whole of the document from which it is taken :—

" It would be cheaper for working men to pay 8d. per week per child for education really suitable for what they require, and to have a master who would really attend to his duties, than to accept assistance, the value of which, as we have seen, is so much diminished by its unsuitability, and from the master being wholly independent of the parents."

If this sentence, as a comment on the existing elementary schools in England, means anything, it means this :—(*a*) That the education given in those schools is not suitable to the requirements of the working man's child, and would be so if the working man himself could control it. (*b*) That the teachers of such schools do not really attend to their duties. (*c*) That they are wholly independent of the parents. " We have seen," says the reporter, complacently, that these things are so ; but they are utterly unsupported by any evidence which I have been able to find, either in his report or elsewhere. As to what " *would be* cheaper," or better, we may all retain our own opinions ; but as to *what is*, it may be worth while to ask where these ideal schools of Mr. Tylor are, in which the education is more suited to the needs of the working classes, in which the teacher does his work more faithfully, and is in a closer and more natural relation to the parents, than in an average National or British School under a certificated master ? I have been studying schools, and in contact with teachers, all my life, and I can testify, from a wide experience of schoolmasters, who, having once been connected with self-supporting or voluntary schools, have afterwards obtained certificates, and been placed under Government inspection, that they have been stimulated to greater efforts, and that their work has become more thorough and systematic than before. As to their dependence on the parents of their scholars, it has remained neither more nor less than before ; for since in almost every school under inspection the teacher's income is regulated in some way by the number of scholars, he has every inducement to make his school popular, and to conciliate the good-will and confidence of the parents around him.

Again, " The system of pupil-teachers is bad ; for no one permits lads to teach boys even the most ordinary work of a factory ; it has always been held indispensable that boys and girls must be taught by grown-up persons, who have so much more power and influence if they are to be well taught."

If the system of pupil-teachers is bad, that which it has superseded—the monitorial system—was worse. The matter is simply one of expense. It is clearly impossible in schools for the poor to provide adult-teachers in sufficient numbers to give the individual instruction here said to be indispensable. The difference between the old Lancasterian schools and the existing uninspected schools on the one hand, and the schools under government inspection on the other, is, that in the former, monitors or mere children are employed ; and in the latter, the work is done by young people from thirteen to eighteen who are apprenticed to the principal teacher for the special purpose of learning the teachers' profession, and who are undergoing during the whole of their pupil-teachership a regular course of discipline and instruction for that purpose. How the withdrawal of government grants, by which alone the pupil-teacher system is supported, would facilitate the employment of older and better teachers, Mr. Tylor does not explain. Most persons believe that such a withdrawal would have exactly the opposite effect, and throw schools back again on the monitorial system.

On the training of public teachers for their work, the report has much to say. But the observations chiefly take the form of incidental references to the mischief of the existing system, the inefficiency of the training colleges, and the badness of the methods pursued in them. One or two specimens of the remarks on this subject may suffice. On the authority of some nameless professor in a training institution, it is stated that " about one in ten (of the pupils) turn out good students." Speaking of the Royal Commission, whose members, by the way, are described as " comparatively ignorant of the matters into which they were deputed to inquire," it is said, " their only conclusion should have been to advise the government to withdraw from interference as soon as possible ; and to impress upon towns the importance of establishing collegiate institutions in each centre of population, such as King's College. Large sums of money can be obtained from private sources for any good work of proved utility, and the opinion of the Commissioners would have had great influence in promoting the establishment of local colleges, while the training colleges for schoolmasters might have been dispensed with altogether in favour of superior institutions." And again, " Neither have they pointed out sufficiently the necessity of training teachers in open educational establishments where a scholarly education could be given them without boarding the students at all."

Many who read this report may not be aware that 39 training colleges are actually in existence ; these are, in fact, local institutions, reported by the Commissioners to be in a high state of efficiency, and adapted expressly for the professional education of schoolmasters and mistresses. With the exception of some six or seven of these, they have all been called into existence by the system of government grants. Mr. Tylor does not tell us how " the open educational establishments " which he would prefer should differ from these establishments, nor by whom they are to be supported, nor what class of persons would attend them, nor what would be the inducements held out to candidates for admission, nor how the fitness of such candidates should be tested and authenticated. Nor does it appear that any such local collegiate institutions as he desires are at present in existence. It is true that the King's College evening classes, which have evidently captivated the imagination of the reporter in a remarkable way, are mentioned with honour, over and over again, in the report. Now I have not a word to say in disparagement of that most wise and hopeful, though somewhat new, experiment. But it is certain that the instruction given in these classes is not designed expressly for teachers, nor adapted in any way to the requirements of their profession. The training and

practice in the art and science of teaching, which are so important for the elementary schoolmaster, are not even included in the course of instruction at King's College. Clerks and shopmen, and a goodly number of thoughtful young men employed in London, find these classes helpful to them, in their efforts after self-improvement; but Mr. Tylor gives us no reason to believe that teachers, either public or private, have to any considerable extent availed themselves of the classes, or that the authorities of King's College ever specially contemplated the admission of this class of persons.

Yet the reporter says confidently, "Should there be local colleges established in our large towns, we might expect a great advance in the acquirements of schoolmasters generally, and a great extension of their influence. The limited number of men who have attended the classes for schoolmasters given in the evening at University College, and have subsequently taken their B.A. degrees, have been most useful in raising the standard of qualification among their own class; *they have promoted a movement for forming a schoolmasters' association*, which in time may be the means of uniting schoolmasters into a powerful corporate body, giving diplomas and regulating the courses of instruction for their members, as in the case of the medical profession."

Mr. Tylor will not, I hope, think me obtrusive, if I respectfully ask him to give me the name of the association referred to in the passage which I have put in italics here. It cannot be the "College of Preceptors;" that is a society of the teachers of schools for the middle and upper classes exclusively; and was certainly not set on foot, or mainly promoted, by the persons described by Mr. Tylor. Nor can it be any one of the associations of elementary teachers. There are three of these in London, the Metropolitan Church Schoolmasters' Association, the British Teachers' Association, and the London Association of Teachers. All of them are sustained and managed almost exclusively by teachers holding government certificates of merit. Some six or eight of these teachers, perhaps, have, in addition to their certificates, obtained the degree of B.A., after attendance at the University College classes; but these gentlemen were not the founders, and are not the most prominent members of the Associations. Above all, no one of these three associations contemplates, or ever has contemplated, any such purpose as that ascribed to them in the report. They are simply societies for mutual improvement, and for reading and discussing papers on questions interesting to teachers. If Mr. Tylor refers to a body called the "United Association of Schoolmasters," the founders of which certainly did entertain hopes of realising the rather ambitious programme described by that gentleman, I must inform him first, that that association never exercised any one of the functions he ascribes to it; secondly, that its number of members was always very small; and thirdly, that it is now virtually defunct.

"Before the interference of government," says Mr. Tylor, "a great number of youths who had a capacity for teaching were trained by private gentlemen, and some of the most successful schoolmasters in London owe their education to the late Mr. Janson." Now, I have no right to question the first of these assertions, because I never heard of the private gentlemen referred to, nor of the "great number of youths" whom they trained. But it happens that I knew the late Mr. Janson very intimately, and that I remember well the kindly and intelligent interest which he took in the studies of a few young men. Of these, two were clerks in his own bank in London, two were artists, one or two have since distinguished themselves in other professions; and one,—I believe only one, is now a schoolmaster. He is the master of the school of which Mr. Tylor is the secretary, or "educationist." Mr. Tylor regards him, not unnaturally, but erroneously, as the type of a class. But in fact, I believe this gentleman will be as much astonished as Mr. Janson himself would be if he were alive, to find the hospitalities and the conversations of Stoke Newington, described after the lapse of nearly 20 years, as having afforded, in any sense, training and education for the schoomaster's profession.

There is a class of persons for whom the reporter can scarcely find censure too strong, but who, as being in every case voluntary and unpaid promoters of public education, might have been supposed entitled to his sympathy. He calls them "educationists," and says of them, "These persons, generally secretaries to school committees, unfortunately place themselves in a position above the master; they limit his power and influence, and stand between him and the parents of the children, and so prevent that progress which *would take* place" (the potential mood is constantly used in the report as if it represented a known fact), "were the schoolmaster looked to as the responsible person in the school, with whom alone the parents had to do." Then follows a long description of the relations between this "educationist" and the inspector, who, between them, are said to manage the whole machine, and to be completely independent of everybody else. All this implies that the managers of schools not under Government inspection exercise less control than others over the appointment of suitable teachers and over the studies of the school. This may be true, although in a large and varied experience of elementary schools I have not found it so; but if it be true, I doubt whether the benevolent supporters of schools which have not received Government aid will thank Mr. Tylor for the compliment. I leave "educationists" themselves, who have made large sacrifices of money and time to establish schools, and who have yet felt at liberty to welcome the aid afforded by the Government grants and inspection, to defend themselves against such imputations as this:—"Educationists now think that if the school-room is handsome, and the teachers can pass their examination, everything is done." "Gentlemen and schoolmasters take all the credit away from the parents, and throw dust in the eyes of the public on these points, making out that the credit is due to themselves."

I must not be supposed to speak here of the early part of the report, which relates to the social condition of the English artizan, and which apparently contains many valuable facts and much acute conjecture. But with regard to the portion devoted to education, I hope I may say, without discourtesy, that it seems to me to be a curious example of unwarranted generalisation, or of what Bacon calls the *inductio per enumerationem simplicem.* Exceptional facts, if they suit the theory of the writer, are treated throughout as if they were typical of great and general principles. Thus Mr. Tylor happens himself to be connected with a very flourishing and admirable institution in the heart of London, which in many circumstances of its history—in its unbroken career of usefulness during many years; in the possession of an excellent master who has a rare gift for teaching which makes him happily independent of all formal training; and I may add in the services of a remarkably zealous and intelligent committee and secretary, which render Government aid equally superfluous—is almost unique among schools. Yet the report, in many places, shows that Mr. Tylor regards it as the representative of a large class, and reasons from this one special example to his general propositions. So also he speaks with high and deserved honour of a gentleman at Hampstead, who for several years has devoted his evenings to the instruction of a few young men of the village; but he has not a word to say in approbation of the Examinations of the Society of Arts, or indeed of any of the great public movements by which adult education has been promoted on a large or national scale. In like manner a considerable space is given to a laudatory description of the Bradford Drawing School, because it was founded by gentlemen who sought to "teach the principles of art and their application to design, without connecting themselves in any way with the Government School Department."

Out of this has grown the "Designers' Art Association," of which Mr. Tylor strongly approves. It is true this association has fallen to pieces, or, to use the euphemistic language of the report, "is in abeyance for the present." Nevertheless it is to this one institution at Bradford that attention is directed, while of the Department of Science and Art, with its 87 drawing-schools and 12,412 scholars, no mention whatever is made. The quotations made from the Commissioners' Report are characterised by the same narrowness. It happens that out of a vast number of witnessess Dr. Temple was the only one who gave the sort of evidence which suited Mr. Tylor's views. Accordingly Dr. Temple is referred to repeatedly as a specimen of the *class of witnesses* whose evidence the Commissioners did not sufficiently regard. It would be easy to multiply examples, but these will, I hope, suffice to justify me in calling public attention to this report.

I must not be understood to complain here of the utterance of opinions hostile to that system of aid which is throughout the report called, somewhat erroneously, the "Government system of education." I have no interest in defending that system. I believe that much can be said against it, and that it is fairly open to criticism. Moreover, I think that we want the opinions of such men as Mr. Tylor on the subject. But I am sure that, although an *ex-parte* statement like his may be very valuable in the form of a review or a pamphlet, nothing should appear as part of a jury report which is not at least characterised by fairness and breadth of view, and which is not the result of large observation, careful induction, and the concurrence of experienced men. My complaint is simply this:—That Mr. Tylor's view of public education, which, however ingenious or even true, is certainly partial and one-sided, is not subjected to the usual ordeal of public discussion, but finds currency as part of a formal report on "Iron and General Hardware."

The members of the Society of Arts have recently had before them for discussion divers interesting questions propounded by the Council respecting the constitution and the work of Juries in connection with International Exhibitions. May I invite them also to consider the question, "What is the theory of a Jury Report?" I take it be this. A gentleman is elected by the jury to write a report on a given subject, because he is presumed to be specially conversant with that subject; and because, having the confidence of his fellow-jurors, he is likely to incorporate fairly into a general report the principal facts and conclusions which have been accepted by that body. Now, it is quite conceivable that many of the gentlemen so selected may be qualified to write admirable essays on other topics than that of their own special class; but how far it is right that such essays should go forth with the authority and *prestige* which belong to a jury report, is surely a question for grave discussion. Here is a document which is to enjoy exceptional advantage, and to be translated into several foreign languages; it is probably destined to be the only picture which many foreigners will receive of the state and prospects of popular education in England. Yet it is rather a polemical pamphlet than a report, and there is no evidence that its statements are sanctioned or would be approved by six practical men in England. I hope I may say this without detracting in any way from its value as a contribution to the honest and fearless discussion of a great subject, or from the ingenuity and skill with which its speculations are set forth.

One word more. The report is published at the request of the chairman of the "Iron and Hardware" jury, Dr. Von Steinbeis, from whom Mr. Tylor has obtained some interesting details respecting the state of public education in Würtemburg, and some strong testimony against the operation of the Government system of education there. That testimony will be better estimated in the light of the following quotation:—"I am glad to be able to give in Dr. Steinbeis's own words the result of the pay schools established in Würtemburg in connexion with the Board of Trade, of which he is a director, which is quite independent of the Board of Education." This gentleman, then, is, in his own country, opposed to the government system of education. He has the good fortune to meet in England with a member of the jury who holds similar views respecting the public education of England; and under their united auspices a report is produced which attacks and discredits not only the whole system of aid sanctioned by the state in this country, but also all the great religious and benevolent societies which have made education their special work, and almost all the elementary schools and teachers in the kingdom.

I am, &c., J. G. FITCH.

Denmark-hill.

Proceedings of Institutions.

Croydon Literary and Scientific Institution.—The report presented at the annual meeting, held on Thursday, October 23, 1862, Edward Westall, Esq., M.D., in the chair, speaks of a year of prosperity to the institution. The society was formed for the purpose of "providing opportunities of acquiring sound and useful knowledge; of cultivating a taste for literature and science; and of promoting a friendly intercourse amongst the inhabitants of the town," by means of classes, a library, reading rooms, lectures and entertainments, &c. To apply the purely educational test in ascertaining the measure of usefulness of all institutions, appears to the committee to be a mistake. The work of class instruction is found to flourish most in the manufacturing districts and in the centres of commercial industry, and, as a rule, more in the northern than the southern counties. Croydon, a suburban town, does not rank with either of these classifications. Whilst the committee is fully alive to the importance of making direct educational movements (no season passing without some additional efforts being made in the way of class instruction); yet that this is the only important function of the institution, is not the interpretation of the committee. In the library, the reading rooms, and the lecture-hall, the report now presented furnishes ample evidence that there is a great appreciation of the benefits offered; and without placing too much stress upon direct educational results, it is surely a token of good, when the intellectual and recreative resources of the institution are so largely drawn upon by the inhabitants—and this, too, at so fractional a cost to each individual, that no one need be debarred on the ground of expense. The income for the year (including the balance brought forward) is £961 6s. 11d., being the largest ever attained, and this, too, when the item of fees for the hire of the hall is so much less. The balance in the hands of the treasurer is £108 6s. 6½d., of which amount the sum of £67 is carried forward as due to the current year, for unexpired terms of membership; so that the overplus, after meeting all expenditures and liabilities, is £41 6s. 6½d. It is proposed to carry £30 of this amount to the public hall fund of the Institution, for further investment in shares. There is still another amount, £58 19s. 5d., arising from dividends on shares in the public hall, and interest, which is not included in the above statement of income, but which is carried to the public hall fund of the Institution. It is thus seen that the total receipts of the Institution for the year exceed £1,000—a point of prosperity which, at the opening of the new building, it was hoped would some day be attained, but which the most sanguine would scarcely have predicted to be realized on issuing the second annual report from that time. The number of members enrolled during the year has been, first quarter, 813; second quarter, 807; third quarter, 781; fourth quarter, 663; average number per quarter, 766; but as many of these are double tickets, it is shown that no less than 947 persons are admissible to the lectures, &c. Although the average number of members is somewhat less

than the previous year, yet more double tickets have been issued, so that whilst in 1860-61—921 stand registered as entitled to attend the lectures, &c., in 1861-62 the number is increased to 947. There is still a marked decrease in the number of members for the fourth quarter; and although additional attraction was offered in a fête given at Addiscombe, yet but a slight improvement in the number took place in comparison with previous years. The committee cannot enforce too strongly the importance of members being annual subscribers, as greatly conducing to the stability of the Institution; in addition, too, such a mode of payment, with second and third class members proves advantageous to the member himself. During the past year 370 volumes have been added to the library; 220 were bought, at an expense of £31 7s. 8d. to the funds of the Institution, and 74 vols. were purchased with donations of money, amounting to £13 9s. 6d., liberally given for the purpose; in addition to which 76 volumes have been kindly presented. The sum of £51 has been expended in the purchase and re-binding of books, and this large sum is not likely to be lessened in future years should the present demand for books be sustained. No less than 522 of the members have used the library during the past year, and the following shows the quarterly issue of books:—October to December, 1861, 2,829 vols.; January to March, 1862, 3,203 vols.; April to June, 1862, 2,736 vols.; July to September, 1862, 2,117 vols.; total issue for the year, 10,885 vols. The lecture season has again been one of success. Thirty-two lectures and entertainments have been given, with an average attendance of 612, and this exclusive of the fête at Addiscombe. On one occasion no less than 1,080 were in the hall, which is not unfrequently too small for the accommodation required. The following is the list of lectures, &c., for the past season:—The Misses Terry, entertainment; Mr. Rowton, lecture on "Ancient Minstrelsy;" Mr. E. Wheeler, lecture on "Voltaic Electricity;" Mr. Basil Young, entertainment; Dr. Letheby, lecture on "Chemical Magic;" Mr. J. T. Topham, lecture on "Dr. Johnson;" Dr. Daniel, lecture on "Napoleon;" Mr. F. Chatterton, harp entertainment; Miss Grace Egerton, entertainment; Rev. H. S. Brown, lecture on "The People's Proverbs;" Dr. Daniel, second lecture on "Napoleon;" Mr. J. H. Pepper, lecture on "Chemistry;" Orpheus Glee Union, musical entertainment; Mr. E. Yates, lecture on "Modern Society;" Mr. Geo. Grossmith, lecture on "Humorous Characteristics;" Mrs. Balfour, lecture on "England in the Sixteenth Century;" Robert Hunt, F.R.S., lecture on "The International Exhibition;" London Glee and Madrigal Union, concert; Dr. Macgowan, lecture on "China;" Rev. A. Mursell, lecture on "The Maid of Orleans;" Mr. and Madame Penna, musical entertainment;" Dr. Lankester, lecture on "The Sea-shore;" the fête at Addiscombe; a concert, vocal and instrumental. The committee most cordially thanked the following gentlemen, who have kindly helped our Institution by giving lectures gratuitously:—Rev. J. Baldwin Brown, lecture on "Alfred the Great;" Mr. A. K. Abbott, lecture on "The Glaciers of the Alps;" Mr. E. Wheeler, lecture on "Animals," &c.; Mr. F. I. Scudamore, lecture on "People we have never met," and lecture on "Post-office Savings Banks;" the Venerable Archdeacon Robinson, lecture on "Hebrew Poetry;" Rev. F. Greeves, lecture on "England in the Olden Times;" Mr. T. E. Crispe, lecture on "Thackeray;" Mr. W. A. Curr, lecture on "The Tower of London." The Singing Classes are conducted under the superintendence of Mr. Budd, whose heart is in the work, and who devotes much of his time to the instruction of his pupils. It is not enough to say that the Croydon Choral Society of the Institution has yielded instruction and pure social pleasure and delight to her members, but she has done much more, by aiding in any good work in which her services could be rendered. The Institution has had her hearty co-operation on more than one occasion, so that in creating a good we have got good in return. The Society have helped other funds in the town; and the last striking instance of usefulness, is that in which, by her own unaided effort, no less a sum than £25 7s. 2d. was realised for the relief of the distressed operatives in the manufacturing districts. A Drawing Class is now conducted by Mr. H. W. S. Edwards; and Mr. R. B. Paull has undertaken to conduct Arithmetic Classes, provided several members are willing to join. The committee earnestly hope that these classes may receive full support from the members—so palpable and important a means of imparting instruction is the best work in which the Institution can be engaged; and it should be here remarked, that if a sufficient number of members should at any time express a desire to the secretary to unite in the formation of a new class which is compatible with the objects of the Institution, such desire will at all times meet with the hearty encouragement of your committee. The committee are gratified to report that the attendance at the reading-rooms has been much greater than during the previous year. The committee, in conclusion, report upon that which is one of the most important features in their present prosperity, namely, the Public Hall Fund of the Institution. The number of shares has, during the past year, been increased from 1,492 to 1,700. Two gentlemen have, during the past year, exchanged their shares for life memberships, and Mr. Thomas Farley has liberally presented his shares to the Institution. The committee would be glad to see this example followed by others, so that, by gradually obtaining possession of the shares, the hall may ultimately become the property of the Institution. To promote this desirable end, the committee lose no opportunity of purchasing shares whenever their funds enable them to do so.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Medical, 8½. Dr. Richardson, "Alcoholic Phthisis."
Royal Inst., 2. Special Meeting of Members.
R. United Service Inst., 8½. Mr. S. Barrass, "Proposed Plan for a wholly Iron-made Armour-plated Vessel."
R. Asiatic, 3.

TUES. ...Civil Engineers, 8. Discussion on Mr. W. H. Preece's Paper, "On Railway Telegraphs, and the application of Electricity to the Signalling and Working of Trains."
Statistical, 8. Dr. Leone Levi, "On the Cotton Trade and Manufacture, as affected by the Civil War in America."
Pathological, 8.
Ethnological, 8. 1. Col. Phayre, "On the Nations and Tribes inhabiting British Birmah." 2. "On the Jews of Aden," by a Native Jew of Aden, communicated by S. H. Bronkhorst.
Royal Inst., 3. Professor Marshall, F.R.S., "On Animal Mechanics."

WED. ...Meteorological, 7.
Society of Arts, 8. Mr. A. K. Isbister, "On Colonisation and Convict Labour in the Hudson's Bay Territories."
Geological, 8.
London Inst., 7.
R. Soc. Literature, 4½.

THURS...Royal, 8½.
Antiquaries, 8½.
R. Soc. Club, 6.
Royal Inst., 3. Prof. Frankland, F.R.S., "On Chemical Affinity."

FRI........Royal Inst., 8. Professor Tyndall, F.R.S., "On Radiation through the Earth's Atmosphere."

SAT........R. Botanic, 3¾.
Royal Inst., 3. W. S. Savory, Esq., F.R.S., "On Life and Death."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, January 2nd*, 1863.]

Dated 23rd December, 1862.

3425. J. Patterson, Beverley, Yorkshire—Imp. in machinery or apparatus for grinding, crushing, cutting, cleaning, and hulling or shelling various kinds of farm or vegetable produce, also applicable to the crushing or grinding of minerals and other substances.

3426. E. B. Wilson, Parliament-street, Westminster—Imp. in apparatus to be employed in the manufacture of malleable iron and steel.
3427. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in the mode of, and apparatus for, converting petroleum or coal oil into gas for lighting and heating, the said improvements being especially applicable to lamps and stoves. (A com.)
3429. S. Russell, 27, Shaftesbury-crescent, Pimlico—Imp. in stereoscopes.

Dated 24th December, 1862.

3430. T. C. Hinde, Cardiff—Imp. in furnaces or apparatus for generating carbonic oxide.
3432. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in instruments for surveying and levelling. (A com.)
3434. F. N. Gisborne, 3, Adelaide-place, London-bridge—Imp. in the means for indicating the speed of ships at sea.
3440. H. Twelvetrees, Bromley, Middlesex—Imp. in washing machines.
3442. R. Lakin, Ardwick, Manchester, and J. Wain, Manchester—Imp. in machines for spinning and for doubling cotton and other fibrous materials.
3444. J. Taylor, Stalybridge, Cheshire—Imp. in engines for carding cotton and other fibrous materials.
3446. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for stamping or marking paper and other materials. (A com.)
3450. C. J. Denton, New Broad-street—An imp. in the process of revivifying animal charcoal.

[*From Gazette, January 9th*, 1863.]

Dated 12th September, 1862.

2520. G. Bedson, Manchester—Imp. in rolling wire and other rods or bars of metal.

Dated 14th November, 1862.

3070. H. Morgan and J. Parkinson, Liverpool—Imp. applicable to weighing machines, part of which may be used to measure liquids.

Dated 15th November, 1862.

3077. A. Illingworth and H. Illingworth, Bradford—Imp. in washing wool and other fibres.

Dated 18th November, 1862.

3096. E. P. Houghton, Liverpool—An improved method of applying breaks or apparatus for stopping or retarding railway carriages.

Dated 5th December, 1862.

3266. P. Cowan, Hammersmith Bridge Soap Works, Barnes, Surrey—An improved method of purifying gas.

Dated 6th December, 1862.

3270. H. A. Bonneville, Paris—Imp. in the manufacture of stockings and socks. (A com.)
3280. J. Joce, Colchester, Essex—An improved composition or compositions for producing artificial sea water, or the odour or effects of sea water.

Dated 10th December, 1862.

3308. L. A. Lesage, 2, Rue Sainte-Appoline, Paris—An improved method of preparing jellies and jams.

Dated 15th December, 1862.

3350. M. Hyams, 55, Bath-street, City-road—Imp. in the manufacture of cigars, cheroots, and cigarettes, and in the treatment of tobacco.

Dated 17th December, 1862.

3375. F. De Wylde, Great College-street, Camden-town—Improved means for the protection and preservation of lead surfaces exposed to the action of water, and for the protection of such surfaces from decomposition by atmospheric action. (A com.)
3376. L. Latter, Leigh, near Tunbridge, Kent—Imp. in ploughs.

Dated 18th December, 1862.

3392. S. C. Lister, Manningham, Yorkshire—Imp. in preparing, combing, and spinning flax, silk, and other fibrous material.

Dated 24th December, 1862.

3448. A. V. Newton, 66, Chancery-lane—An improved construction of skate. (A com.)

Dated 26th December, 1862.

3454. E. T. Loseby, 124, Wood-street, Cheapside—Imp. in the construction of instruments for ascertaining the pressure and the moving force of the atmosphere.

Dated 27th December, 1862.

3456. W. H. Samson, Underhill, Wittersham, Kent—Imp. in certain machinery for cultivating land by steam power.
3458. J. Freemantle and S. Freemantle, Gosberton, Lincolnshire—Imp. in apparatus for propelling vessels.

Dated 29th December, 1862.

3460. M. Ker, 14, Camden-street, St. Pancras—An imp. in wardrobes or other pieces of furniture or fittings, with glass silvered doors or panels used for toilet purposes.
3462. J. H. Riddell, 155, Cheapside—Imp. in cast metal or other pipes or tubes for conveying gases, fluids, or vapours, and in the mode of connecting such pipes or tubes.
3466. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in cartridges, and in the mode of charging small arms and ordnance. (A com.)
3468. W. E. Newton, 66, Chancery-lane—Imp. in preserving organic substances from decay.

Dated 30th December, 1862.

3472. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in ingot moulds employed in the casting of steel and other metals. (A com.)
3476. W. Mould, Belmont, near Bolton, Lancashire—Certain imp. in machinery or apparatus for plaiting or folding and measuring fabrics.
3478. W. Richards, Birmingham—Imp. in cannon and other fire-arms, and in apparatus connected therewith.

Dated 31st December, 1862.

3488. F. Jaques, Nelson-terrace, Stoke Newington—Imp. in cases for pipes, mouth pieces, cigars, and other analogous articles.
3490. W. Maltby, De Crespigny-park, Camberwell—Improved means of extinguishing fires by the use of substances not hitherto so applied.

Dated 1st January, 1863.

2. W. H. Brown, Sheffield—Imp. in battery plates.
6. R. Faulds, Glasgow—Imp. in traction engines or common road locomotives.
8. J. Jones, Rhodes, near Middleton, Lancashire—Imp. in finishing or stiffening textile fabrics.
10. W. Robinson, Birmingham—An imp. or imps. in glasses for lamps used in ships, railway carriages, and for other like purposes.

Invention with Complete Specification Filed.

483. F. Applegate, Bradford-on-Avon, Wiltshire—Imp. in the manufacture of a kind of woollen cloth, known to the trade as deerskin.—31st December, 1862.

Patents Sealed.

[*From Gazette, January 13th*, 1863.]

January 13th.
2019. C. Crossley and J. W. Crossley,
2023. P. A L. Canonicat.
2024. G. Fawcus.
2025. F. M. Parkes.
2026. O. P. Drake.
2028. A. Leslie.
2029. A. Couvreux.
2030. J. Green.
2031. A. Couvreux.
2033. W. Dickens and J. Hewitt.
2034. C. E. Crawley and F. Foster.
2037. G. T. Selby.
2039. W. Henson and W. W. Clay.
2044. J. Dickson.
2048. T. B. Daft.
2050. W. Gossage.
2056. R. A. Brooman.
2058. A. B. Brown.
2059. G. J. Yates and T. W. W. Tindall.
2066. T. H. Saunders and J. Millbourn.
2082. J. Daniels.
2088. T. King.
2092. J. J. Haley.
2101. J. Dickson.
2120. E. Tysall.
2126. R. Low and W. Duff.
2168. J. W. Dixon.
2169. J. W. Woodford.
2171. W. Weild.
2180. G. Haseltine.
2193. G. Coales. J. A. Jaques, and J. A. Fanshawe.
2242. W. Clark.
2253. J. Dickson.
2452. W. E. Bovill.
2527. H. Bennett.
2837. J. Duke and J. Cleaver.
2938. H. L. Corlett.
2956. M. Merryweather, R. M. Merryweather & E. Field.
2961. J. Winter.
3060. R. Sykes and P. Sykes.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, January 13th*, 1863.]

December 31st.
3953. X. C. de Nabat and A. C. de Nabat.
January 5th.
31. A. Chambers.
39. J. Knowles.
46. E. J. Harland.
72. J. Jameson.
January 7th.
70. W. Cotton.
82. C. De Bergue.
January 9th.
58. P. Czugajewicz.
328. J. R. Cooper.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, January 13th*, 1863.]

January 5th.
53. S. C. Lister and W. Tongue.
87. W. Smith.
January 9th.
92. H. Emanuel.

Journal of the Society of Arts.

FRIDAY, JANUARY 23, 1863.

CENTRAL COMMITTEE OF EDUCATIONAL UNIONS IN CONNEXION WITH THE SOCIETY OF ARTS.

The following circular, enclosing particulars of the Examinations of the Central Committee (see the last page of the Society's Examination Programme) has been issued to the Institutions:

Society of Arts, John-street, Adelphi, London, W.C., 22nd January, 1863.

Dear Sir,—I beg to call your special attention to the Elementary Examinations of the "Central Committee," of which I enclose particulars.

These Examinations are intended principally for those who are not sufficiently advanced to be able to avail themselves of the Final Examinations of the Society of Arts.

In case of your having any Candidates, you will observe that application should be made to me for the requisite forms on or before the 2nd February.

I am, dear sir, yours faithfully,
P. LE NEVE FOSTER,
Secretary to the Central Committee.

SEVENTH ORDINARY MEETING.

Wednesday, January 21, 1863.

The Seventh Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 21st inst., Sir Thomas Phillips, F.G.S., Chairman of the Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Browne, William, jun.	Patent Rope Works, Wivenhoe, Colchester.
Collyer, Charles Edwards.	150, Fenchurch-street, E.C.
Dawbarn, Richard Wood.	Wisbech.
Merry, William L.	13, Pembridge-place, Bayswater, W.
Rivett, Joseph Adric	Prestoln, near Bolton, Manchester.
Willis, James	42, Little Britain, E.C.

The following Candidates were balloted for and duly elected members of the Society:—

Ell, George	366 & 368, Euston-road, N.W.
Home, D. Milne, (Royal Horse Guards)	Hyde-park Barracks, W.
Jones, James W.	86, Piccadilly, W., and 28, Mark-lane, E.C.
Hewlett, Anthony Hare	Burlington arcade, W.
Klaftenberger, Charles I.	157, Regent-street, W.
Lainson, George	1, Henry-place, Clapham, S.
Macadam, Stevenson, Ph.D., F.R.S.E., F.C.S.	President of the Royal Scottish Society of Arts, Edinburgh.
Martin, William Henry	64 & 65, Burlington-arcade, W.
Matthews, Frank, jun.	Driffield, Yorkshire.
Nash, John Tullock	9, St. Stephen's-road, Bayswater, W.
Pease, Joseph Whitwell.	Woodlands, Darlington.
Rosser, S. Egan	Percy Chambers, Northumberland-st., Strand, W.C.
Sands, Thos. C.	7, Bishopgate-street, Leeds.
Tucker, Prof. Raymond	Wellington College, Sandhurst.
Watkins, James	Grammar and Commercial School, Deptford, S.E.
Wiener, Charles	88, Ebury-street, Eaton-square, S.W.
Williams, George Joseph.	17, Cavendish-place, Cavendish-square, W.
Wise, Francis	Chandos Chambers, Buckingham-street, Adelphi, W.C.

And as Honorary Corresponding Members:—

Dammas, M.	Berlin.
Dietrich, M.	Berlin.
Steffeck, Professor	Berlin,

The Paper read was—

CONVICT LABOUR AND COLONISATION, WITH SUGGESTIONS FOR THE ESTABLISHMENT OF A NEW PENAL SETTLEMENT IN THE HUDSON'S BAY TERRITORIES.

By A. K. Isbister, M.A., of the Middle Temple.

The history of convict discipline and transportation is intimately connected with the growth and extension of the colonial empire of this country, and, consequently, with the spread of its Commerce, Arts, Manufactures, and Political Power. It is from this aspect, as coming legitimately within the province of this Society, that it is proposed in the present paper to discuss the important subject of convict labour and colonisation, a subject, at this moment, exciting a deep and general interest throughout the country.

The law books tell us that exile was first introduced as a punishment in the reign of Queen Elizabeth, by Stat. 39 Eliz., c. 4, which enacted that "such rogues as were dangerous to the inferior people should be banished the realm." The statute in which the word transportation is first used is Act 18 Car. II., c. 3, which gives a power to the judges, at their discretion, either to execute or transport to America for life, the mosstroopers of Cumberland and Northumberland. Transportation was first brought into general use, as a punishment, in the year 1718, by Stat. 4 Geo. I., c. 11, continued by Stat. 6, Geo. I., c. 23, which allowed courts of law a discretionary power to order felons who were by law entitled to benefit of clergy, to be transported to the American plantations. Under these enactments persons were allowed to contract for the transportation of convicts to the colonies, with an interest in their labour for seven or fourteen years, according to the period of the conviction. The system of transportation to the American colonies continued for fifty-six years, until the breaking out of the American Revolution in 1775. The convicts having accumulated greatly during the next few years, when the intercourse with America was closed, it became necessary to resort to some other expedient, and in the choice of difficulties the system of the hulks was suggested, and first adopted under the authority of a Statute of 16 Geo. III. Various other expedients were subsequently tried, such as the establishment of penitentiaries, and the employment of convicts in clearing and deepening the Thames and other rivers. These expedients proving, however, ineffectual to meet the evil, transportation was again revived in 1784, by Act 24 Geo. III., c. 56. After some unsuccessful attempts to dispose of the convicts through the medium of contractors, in our settlements in Africa, Botany Bay, on the eastern coast of New South Wales, was, in the year 1787, selected as a permanent receptacle for criminals, and an Act of the Legislatue was passed authorising the establishment of a Court of Judicature, for the trial of offenders who should be transported there. The system of transportation to Australia thus inaugurated continued in operation, greatly to the advantage not only of the mother country, but of the colonies, until the appointment of the Committee of the House of Commons in 1837, commonly known as Sir William

Molesworth's Committee, which reported so strongly against the system, and its injurious operation in impeding the progress of free emigration, that the Government were forced to discontinue it. The abandonment of transportation was strongly opposed at the time by the colony of New South Wales, which may truly be said to have been itself the creation of convict labour; but when, a short time afterwards, the Government attempted to re-introduce it, it was found that the agitation set on foot in England had effected a complete revolution in the sentiments of the colonists, who now refused to receive any more convicts from Britain. Attempts were then made to distribute them partially among other colonies, but the Cape of Good Hope actually rebelled against the experiment. Its example was shortly afterwards followed by Van Dieman's Land, and, by 1853, Western Australia was the only colony willing to receive convicts in small numbers. In that year transportation was finally abolished as a judicial sentence, by the Act 16 and 17 Vict., c. 99, and "Penal Servitude" substituted in its place. Under this system, criminals, as is well known, are subjected to three distinct stages of reformatory treatment. 1. A period of separate confinement in gaols adapted for that purpose in various parts of the kingdom. 2. A period of associated labour, or penal servitude, in proportion to the length of the sentence. 3. A period of modified freedom, on "Ticket-of-leave," at home or in the colonies, Western Australia being, as already mentioned, now the only colony available.

It is not my intention to trace the various modifications which the system of penal servitude has undergone, or to investigate the causes which have led to its failure, for that it *has* failed seems now to be admitted even by its warmest advocates. It is difficult, indeed, to conceive how a system could otherwise than fail, the essential principle of which is the annual discharge of some thousands of criminals, after their term of reformatory discipline has expired, upon a population whose social system they have outraged perhaps for a series of years—a population which will not receive them; which will not employ them; which has no place for them; and where they are consequently, and of necessity, cast back upon a fresh career of crime as the only means of preserving a wretched existence. Against this inexorable social law our model prisons, our penitentiaries, our reformatory efforts, however meritorious, are powerless, for so long as these expedients fail in re-establishing the criminal as a useful citizen at the end of his sentence, the great object for which they were instituted remains unaccomplished, if, indeed, they are not, in reality, aggravating the evil they are designed to eradicate, by casting forth annually on society the materials which, sooner or later, go to swell the ranks of that great army of crime which is recruiting so rapidly in our midst, and to which every year is contributing fresh additions.

To remedy this evil, transportation appears to me to be the best system of punishment which has ever been devised, being, to quote the words of the late Lord Chancellor Campbell, "a punishment very formidable in anticipation, yet comparatively mild in endurance, affording the public the best security against repetition of the crime, and affording the convict the best, perhaps the only, chance of reformation." We all know what important results it has achieved in our American and Australian colonies, where the labour of convicts, properly utilised and directed, has contributed so largely towards opening up new and productive sources of wealth for the mother country, and laying the foundation of great and prosperous communities, which are, at this day, amongst the largest consumers of our manufactures, and among the chief supports of our commercial pre-eminence and prosperity. There is no reason whatever why an experiment which has been already so successful should not be repeated. We have seen that for more than fifty years it worked successfully in America, when it was suddenly arrested by the War of Independence. It was for a similar period equally successful in New South Wales, and its discontinuance there, strongly opposed as we have seen, in the first instance, by the colony itself, was, in reality, not the work of the colonists, but of Sir William Molesworth's Committee and a few active partisans in this country, who appear to have been mainly influenced by the reports of the operation of the system under very anomalous and exceptional circumstances in Norfolk Island. The evidence given before the committee on that occasion, and the use to which Norfolk Island was then, and has since been, applied by the opponents of transportation, affords a striking illustration of what may be effected by skilful and persevering agitation.

The horrors of this "pandemonium" have invariably formed, and form to this day, the stock argument flung at the head of any luckless wight who advocates the establishment of a penal settlement. As a writer in a recent number of the *Times* well observes, "To create a new penal settlement is, we are told, to create a 'Norfolk Island;' and there are those who consider that the simple use of these two words disposes of a great question. Let us look for a moment at the facts. Disagreeable as the contemplation may be, it is necessary. Norfolk Island was the seat of an establishment for the detention of convicts sent to the Australian colonies, and again convicted in those colonies—the very quintessence of villany. That the habitual life of such a community was one from which the imagination shrinks, is, no doubt, true enough; and it so happened that just then, an able and powerful party at home was zealous against transportation, and that party found in the horrors of Norfolk Island, narrated by some very clever witnesses in 'sensation' evidence, just the material they wanted to act on the popular imagination. It never occurred to them to discriminate—or rather, it would not have suited their purpose to discriminate—between the results of mismanagement or other special circumstances, in Norfolk Island itself, and the miserable, but inevitable, results, of every system of punishment by which criminals, under the full impulses of their wretched animal nature, are either herded together in gangs or buried in the inaction of penitentiaries. It is easy to talk of the horrors of Norfolk Island; but has any one ever dared to investigate those of Bermuda, or Gibraltar, or even of Portland and Dartmoor? Has any one ever sought to compare them with the mass of moral misery engendered in our prisons under the 'solitary' or the 'separate' systems? Nay, strange to say, have many of us reflected on the inconsistency of denouncing 'penal settlements,' and yet encouraging the emigration of masses of Chinese or other labourers, all, or nearly all, male, to regions where it is supposed their labour may be profitable? I ought to apologize for dwelling at all on such subjects, but it is necessary at least to allude to them, in order that we may be fully sensible of the humiliating but unavoidable truth that every system of secondary punishment presents but an aspect of misery from which, if we look at it separately and not in comparison with others, our moral sense shrinks so as for the time to paralyze our judgment."

Criminals must be punished notwithstanding, and how this can best be accomplished so as to secure the two great objects of all preventive punishments—the protection of society and the permanent reformation of the offender—is the question which we are now called upon to decide. I would willingly add to these objects one which this Society may legitimately, in the interest of the public, take its part in promoting, namely, "that the punishment should, as far as possible, be of such a nature as to render the criminal useful to society during its infliction."

That transportation unites these three elements in a greater degree than any other mode of punishment will probably be admitted by all, and that it has not been at once adopted under the pressure of our present difficulties, arises no doubt mainly, if not entirely, from the reluctance which the Government must naturally feel to enter upon an undertaking, the success of which is dependent so entirely on the fluctuating opinions and interests of a

distant colony where the experiment must be practically worked out. Hence the opinion widely prevails that the time has come for the creation of a new penal settlement which shall, if possible, be entirely under our own control, and where, by avoiding the errors of our past policy, we may be able to establish a permanent receptacle for our criminals, and impart something like stability and certainty to our penal legislation.

Much of the success of such an experiment will of course depend on the locality selected. Wherever that may be, it is above all things desirable that the error which has been fatal to so many costly and abortive efforts of this nature already, should be avoided. For a penal settlement to be permanent it is essential that neither the country nor the climate shall be too good for the purpose; that the territory selected shall be good enough to yield to industry and labour the means of support, but not so inviting as to form an attraction to free settlers, who, after a time, will drive out the convict and compel us to find a new home for him elsewhere.

If the history of transportation is examined, it will be found that it is mainly to the neglect of this important principle that the failures and interruptions to which it has been subjected are due. In our early American settlements, in Australia, in Tasmania, in short, wherever we have gone, we have selected countries possessing probably the greatest attractions in regard to climate, soil, and other advantages for emigration in the whole range of our colonial possessions, and the results have been everywhere the same. After an enormous expenditure in establishing one penal settlement after another (each experiment costing us, it has been stated, not much less than half a million sterling!) we have been compelled, through the large influx of free settlers, who would no longer tolerate the presence of convicts among them, aided by agitators at home, to abandon them in turn, while to the criminal himself, transportation to such countries soon lost its terror, and ceased to be regarded as a punishment at all.

To establish a new penal settlement in any part of the Australian colonies, or in countries of similarly inviting character, as has been proposed, appears to me, therefore, with these facts before us for our instruction and warning, simply to invite a repetition of the failures which have compelled us to abandon transportation altogether, and resort to the far less effective system of penal servitude.*

What we want is a country presenting such conditions as will render transportation a permanent remedy for what in our state of society must be regarded as a permanent evil, and not a mere temporary resource, which may fail us at any moment.

I propose in the present paper to draw attention to a territory which I have more than once recommended for this purpose, and which appears to me to combine in a higher degree than any other in our possession all the requisite conditions for a great and comprehensive scheme of penal colonisation. I refer to the immense uninhabited country surrounding Hudson's Bay, occupying an area nearly equal to that of the whole continent of Europe, and capable of absorbing within its ample limits the criminal population of England for centuries to come.

In inquiring into the suitability of this territory for the purposes here contemplated, it is impossible not to be struck at the outset with the singularly close analogy it presents, in all important respects, to perhaps the most successful example of a penal colony in modern times—the Russian settlement of Siberia. Nor is it easy to repress the conviction that under a different system as respects the development of its manifold natural advantages, this portion of the continent of North America might, from its geographical position and inherent resources, stand very much in the same relation to the Crown of England which its antitype in Northern Asia bears to the empire of Russia—which exercising over it the effectual sway of an organized Government, profits in return by the vast resources which it develops.

"The system on which Siberia has been, and continues to be colonised," says a recent English traveller in this region, "is admirable alike in theory and in practice. The perpetrators of heinous crimes are sent to the mines; those who have been banished for minor delinquencies are settled in villages or on farms; and political offenders, comprising soldiers, authors, and statesmen, are generally established by themselves in little knots, communicating to all around them a degree of refinement unknown in other half-civilized countries. In fact, for reforming the criminal, in addition to the punishment of the crime, Siberia undoubtedly is the best penitentiary in the world. When not bad enough for the mines, each exile is provided with a lot of ground, a house, a horse, two cows, and agricultural implements, and also for the first year with provisions. For three years he pays no taxes whatever, and for the next ten, only half the full amount. To bring fear as well as hope to operate in his favour, he clearly understands that his very first step will send him from his home and his family to toil as an outcast in the mines.

* * * *

"Through her system of deportation, Russia has thus been indebted to Siberia for the amelioration, both moral and political, of her own condition. She has made good citizens of myriads who in other countries would have been indirectly condemned, on their first conviction, to a life of ignominy and shame; and thus has she virtually achieved the miracle of reconciling the safety of the innocent, not merely with the impunity, but even with the prosperity of the guilty."*

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* The Falkland Islands have recently been proposed among other localities for this purpose. I have no personal knowledge of this territory, but the following communication, which appeared in one of the daily papers, seems to be conclusive as to the impossibility of establishing a self-supporting settlement in that bleak and dismal region:—

"THE FALKLAND ISLANDS AS A PENAL SETTLEMENT.

"SIR,—The Falkland Islands are at present attracting some attention as a likely locality for the establishment of a penal settlement. It may, perhaps, be of some public interest just now to state that the project, which is not a new one, was brought before the Transportation Committee of the House of Lords in 1856, who, after a very careful inquiry, pronounced it to be impractiable. Among the witnesses examined on that occasion was Mr. G. Rennie, who had been for seven years and a half Governor of the colony, and had then just returned. The following questions and answers from Mr. Rennie's evidence will, I think, convince every impartial person that the proposal of establishing a penal settlement in those islands, just now so strongly advocated, is, to say the least of it, an extremely injudicious one.

"Question 415. Are the committee to understand that your attempts to raise corn, though repeated, have been quite unsuccessful?—Mr. Rennie: Quite unsuccessful.

"416. And so with every other kind of grain?—Mr. Rennie: And so with every kind of grain.

"417. Do potatoes grow there?—Mr. Rennie: Yes; all kinds of English vegetables grow well where sheltered.

"418. Do you mean by 'sheltered' in the valleys?—Mr. Rennie: In gardens, surrounded by walls.

"419. Will not potatoes grow in sheltered valleys?—Mr. Rennie: The peculiarity of the island is, that the prevailing winds are westerly, and the valleys generally run east and west.

"420. So that the valleys are worse than the hills?—Mr. Rennie: Yes, they become funnels in fact.

"I am desirous of drawing attention through your columns to these facts, which seem to me to be fatal to the selection of the Falkland Islands as a penal settlement. A country where neither a tree nor a blade of corn can be grown, and where the inhabitants must be fed from England, at a distance of 8,000 miles, is certainly not fit for any settlement either penal or free, and could only be kept up at a ruinous expense.—I am, &c.,

GEOGRAPHICUS.

"London, Dec. 29."

* *Overland Journey Round the World, by Sir George Simpson, Governor of the Hudson's Bay Company's Territories* pp. 395, 442. London: Colburn, 1847.

Nor, turning from its effects on Russia, to the direct benefits it has been the means of conferring on Siberia, are the results of this far-reaching and beneficent system of policy—anticipating rather than following, in all cases, the steps which have been taken to colonise the country —less worthy of notice.

Notwithstanding the great extent of this vast territory, the inhospitable character of the climate in which a large portion of it is situated, and the physical difficulties to be encountered in traversing it, there is perhaps no part of it which is not virtually, as well as nominally, under the power of the Russian Government. It is divided and subdivided, and placed under the administration of governors, having a regular establishment of subordinate officers; and the constant communication of a regular post maintains an intercourse between St. Petersburg and every place intervening between it and the farthest fort of Kamschatka. The influence of a controlling system is felt by the native tribes, who subsist on the soil which their forefathers occupied before them; and who, though it cannot be said to what extent they have lost the nomadic character of their predecessors, are become a peaceable, and, more or less, agricultural people. The Government restrains and regulates an increasing exile population, of whom (although individual cases of hardship must doubtless occur) we are told the general lot is as happy and prosperous as is consistent with their unhappy condition. At the same time, the resources of the territory have been sedulously and effectually developed; added to which, numerous important sources of a valuable foreign trade have been opened up. Of these it will be sufficient to mention, as the most important branches, the fur trade, the trade in ivory and leather, the international traffic with China, and the mines and washeries of the Siberian and Uralian gold fields, which, as is well-known, now constitute one of the chief sources of the revenue of the Russian empire. And all this, it should be observed, has been going on simultaneously with an annual influx of some thousands of convicts, continued for more than two centuries without intermission, and without any symptom of the system giving way or coming to an end.

I have dwelt at this length on the example of Siberia, because it affords a practical illustration of the development and successful operation of a system which it appears to me might be imitated with advantage in our own unoccupied possessions in North America. In the vast region surrounding Hudson's Bay, comprising an area of nearly equal extent, we have a precise counterpart of Siberia, and all the requisite conditions for an equally successful and comprehensive system of penal colonisation. We have in both territories a great trading company, monopolising the only important traffic, that in furs; but leaving the country, which they do not otherwise make use of, free to occupation and settlement as it may be wanted. Situated nearly under the same latitude, and exposed to similar physical conditions, the climate of both regions is severe, but not unhealthy; and the soil, though in large parts unproductive, is in others well adapted for agricultural purposes.

Within the last few years we have had, as respects the Hudson's Bay Territory, a most thorough and trustworthy investigation by a Committee of the House of Commons, of the character and resources of the country; and in the valuable report presented by them to Parliament, we have the most ample evidence that it possesses, as regards its climate and adaptation for settlement generally, all the requisites of a great and successful penal colony. I shall have occasion to show, as I proceed, that while, as compared with the corresponding districts of Northern Asia under the dominion of Russia, these territories afford the advantage of a readier access, namely, by sea, from the mother country, and an unrivalled system of inland water-communication, they possess, at the same time, intrinsic resources at least adequate for the support and beneficial employment of a population, and the profitable investment of capital and labour. To these resources I shall now proceed briefly to refer.

A survey of the unoccupied tracts of British North America would present for notice five great natural regions:—

(1.) The Columbian or Western Territory (comprising the greater part of the colony of British Columbia, with the adjacent districts)—a country of varied features, extending from the Rocky Mountains to the Pacific Ocean, and bounded severally on the north and south by the possessions of Russia and the United States.

(2.) The Prairie Region, drained by the Saskatchewan, the Red River and their affluents, and extending from the Rocky Mountains eastward to the chain of Great Lakes, affording a continuous communication by water from Canada to the Polar Sea in one direction, and, with some interruptions, a similar communication westward with the Pacific Ocean.

(3.) The Wooded Region, occupying the remaining section of the country, to the shores of Hudson's and James's Bays, having for its northern limit the highest feeders of the Churchill River, and continuous southward with the vast primeval forest so well known as the seat of the lumber trade of Canada.

(4.) The strip of sterile country familiarly known as the "Barren Grounds," skirting the shores of the Polar Sea; and

(5.) The Valley of the McKenzie and its tributaries, a well-wooded tract, situated north of the Prairie Region, and comprising the district between the Barren Grounds and the Russian settlements on the north-west coast.

The general character of the different districts will be sufficiently comprehended from this summary. Their united area cannot be correctly given; it certainly exceeds three millions of square miles; it is probably not much under four.

Excluding British Columbia, which, for the purposes of the present paper, may be omitted from our review, the most remarkable characteristic of the country east and north of the Rocky Mountains, consists in the numerous large rivers which traverse it. One of the most striking features connected with these rivers is the remarkable interlockage of their waters, forming natural systems of water communication by means of which the country can be traversed in every direction. Most of the rivers which drain what has been termed the "Wooded Region," have their outlets in or near James's Bay. One of the most important of these, on account of its situation, is the Moose River and its affluent, the Abbitibee. Both rise in lakes situated on the high ground between Canada and the Hudson's Bay territory, and being connected with the upper waters of the Michipicotton and Ottowa rivers (the former flowing into Lake Superior, and the latter into St. Lawrence,) are accordingly used as the most convenient means of communication between both countries, and are the most frequented roads from James's Bay to the great commercial town of Montreal. Another important stream is Albany River, which affords a communication by means of English River and its tributaries and connected lakes, between James's Bay and Lake Winipeg. The Rupert River, which has its outlet at the bottom of James's Bay, and whose head waters are connected with those of the Saguenay of Lower Canada, affords a similar communication in an opposite direction with the Gulf of St. Lawrence, which is thus connected with Hudson's Bay on the one hand, and with Lake Superior, Lake Winipeg, and the Saskatchewan on the other. All these routes are more or less in actual use by the voyagers of the Hudson's Bay Company, and, although in their present condition they are unfit for the navigation of anything but small river craft and bateaux used in the fur trade, the existence of so many means of water-communication, all interlocking with each other, is an interesting feature which may be turned to important account hereafter in the future history of these countries,

Lake Winipeg is the centre of another remarkable river system, whose numerous ramifications extend in every direction to the remotest parts of British North

America. This inland sea, as it may appropriately be termed with its system of associated lake basins—the Winipegoosis and the Manitobah—receives at its northern extremity its largest tributary, the Saskatchewan. All the waters which descend from the eastern declivity of the Rocky Mountains, between 47 and 53 degrees north latitude, unite in two large rivers the northern and southern branches of the Saskatchewan. Both branches form a junction about 450 miles from their source, and after a course of about 300 miles more, the united stream falls into Lake Winipeg, from which it again issues under the name of Nelson River, and after expanding several times in its course into lakes, finally empties itself into Hudson's Bay, near York Factory. It is navigable for boats from Rocky Mountain House, in longitude 115 deg. west, to Lake Winipeg, in longitude 98, upwards of 700 miles in a direct line, but by the actual course of the stream nearly double that distance. The north branch, whose sources are separated only by "a short portage" from those of McKenzie and Frazer Rivers (flowing respectively into the Northern and Pacific Oceans), is navigable from Fort Edmonton downward, without a single portage alike for boats and canoes. The upward navigation is, however, interrupted by a formidable rapid at the entrance of the river into Lake Winipeg, where boats, although they can descend without unloading, are unable to stem the force of the current in ascending, and have, therefore, to be transported over a portage more than a mile in length. The south branch is quite free from interruption, and is upon, the whole, a still finer stream than the northern. The whole river from its rise in the Rocky Mountains to its embouchure in Hudson's Bay is about 1,500 miles in length. The intercourse between Lake Winipeg and Hudson's Bay is chiefly carried on by means of a chain of small lakes and rivers, uniting in York River, which runs nearly parallel with the Saskatchewan or Nelson, the two rivers falling into the sea nearly together. On the tongue of land between their mouths is situated York Factory, the principal port in Hudson's Bay, and the emporium of the Hudson's Bay Company's trade.

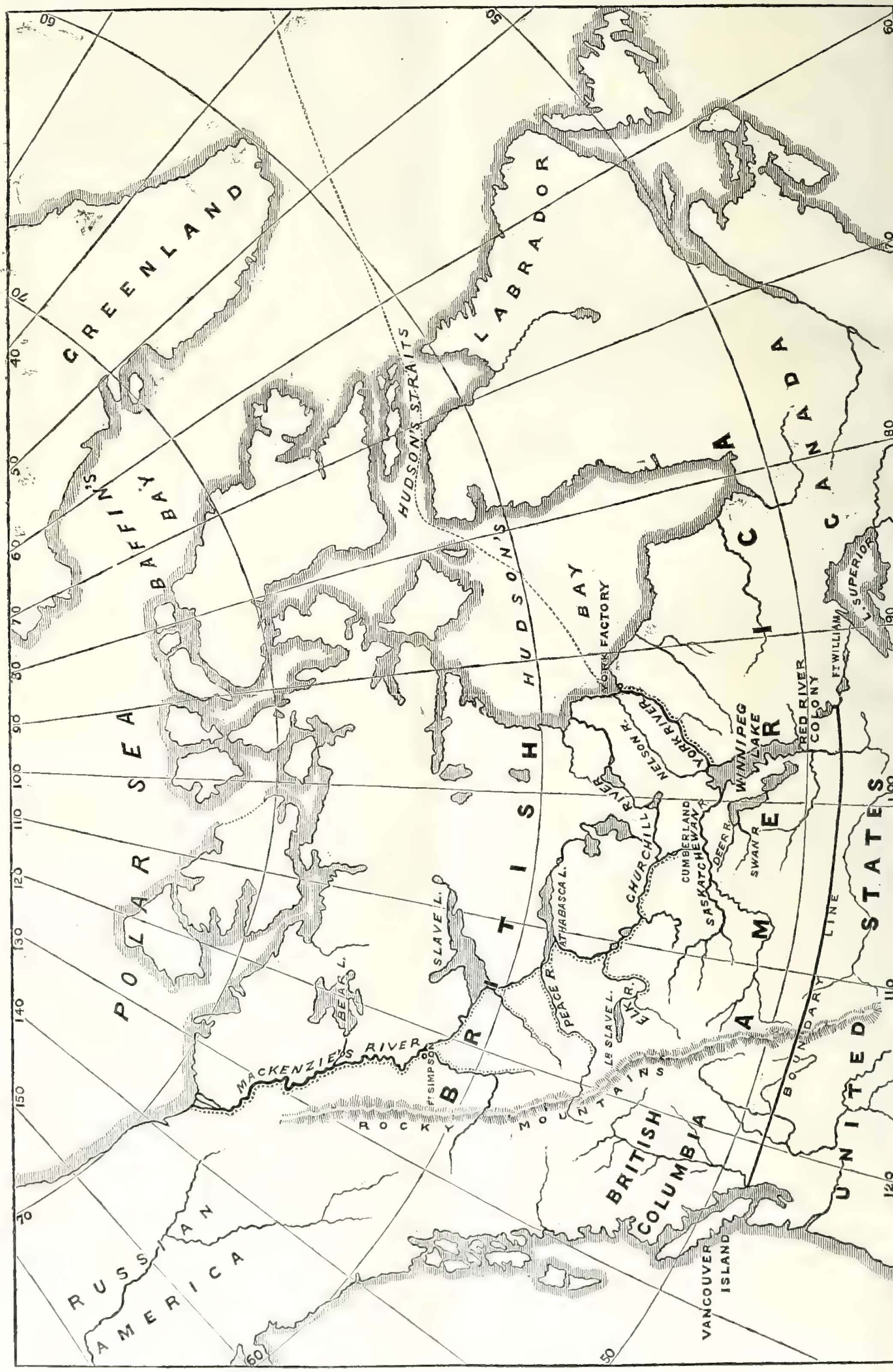
Another large stream exceeding the Saskatchewan in length, in volume, and in the extent of territory drained by its tributaries, is the McKenzie, rising like it in the eastern slopes of the Rocky Mountains, and flowing after a course of about 2,500 miles in a generally north and north-western direction into the Polar Sea, in lat. 68 deg. 30m. N., and long. 135 deg. W. The head waters of the McKenzie not only closely approach those of the Saskatchewan, but also those of the Columbia and Fraser Rivers, flowing through British Columbia into the Pacific, so that here again we have one of those remarkable interlockages of river systems even among the crests of the Rocky Mountains, which form so characteristic a feature of the physical geography of this portion of the continent of North America. There is a direct communication by means of a series of rivers and lakes which strike off from its northern extremity between Lake Winipeg and the McKenzie on the one hand, and, as already stated, between the same lake and York Factory on the other, by means of the York River, thus affording a direct water communication through the interior of the continent between Hudson's Bay and the Polar Sea. It is along this route, navigable throughout for boats, that the inland traffic of the Hudson's Bay Company is carried on, and by means of which supplies are forwarded from post to post without difficulty, from the emporium at York to the remotest stations on the McKenzie.

Here along a continuous waterway of between four and five thousand miles in extent, we have a country admirably adapted for a comprehensive scheme of penal colonisation—land certainly not of the first quality, and the less likely on that account to attract voluntary emigration, but susceptible of cultivation, and well adapted in many places for pasturage and the rearing of stock; timber in inexhaustible quantity and suitable for all the requirements of settlement; rivers and lakes abounding in fish of the best quality; and, lastly, a climate severe but healthy, and as proved by the experience of the servants of the Hudson's Bay Company, who have occupied the country for nearly two centuries, congenial to the European constitution.* In such a country, where the choice lies between labour and want, enforced residence would of itself have all the force of a deterrent punishment, without resorting to the artificial expedients and restraints necessary in more favoured regions. A narrow verge of settlement on the banks of a rapid stream, with an impenetrable forest on either side, rendering escape hopeless except with the certainty of perishing in the wilderness, presents so many facilities for guarding the convicts which might be settled there, that not only would the expense of a costly guard be in a great measure dispensed with, but attempts at escape would probably be but few, and when made easily defeated. They could only be made in one way, that is by the river, and as the direction of both the York and the McKenzie is *away* from civilisation, the difficulty of escape is greatly increased, and rendered, indeed, practically insurmountable. To escape *down* either of these rivers to the icy seas in which they empty themselves would be simply to invite destruction; and, on the other hand, to ascend and drag a boat up an impetuous river, interrupted by numerous portages, rapids, and waterfalls, is a feat physically impracticable to an unaided individual, and possible of accomplishment only by the union and organisation of many. The Russian system of planting a convict down on a piece of ground with such assistance in the way of agricultural implements and stock as to give him a fair start for life, would, in such a country as Australia, be simply a premium upon crime. But in the country we are now considering it might be done without injury, for, shut out as the exile would be from all intercourse with civilised society, and guarded by bitter blasts, the most favourable view could not picture his lot as aught but hard. For the worst class of criminals, and for refractory or re-convicted felons, there would be the "hard labour" of road-making, clearing the portages and obstructions to navigation, and, lastly, as in Russia, and in the state of New York, for incorrigible offenders, working in mines. To the well-conducted, on the other hand, might be held out the hope of being removed to the milder climate and the more fertile country around Lake Winipeg, between which and the bleak shores of Hudson's Bay, or the Polar Sea, a chain of settlements might be established, affording all the gradations between a country where wheat grows luxuriantly, and one where potatoes and garden vegetables can be raised only with difficulty—in other words, between a position of comfort and ease and a life of penury and hardship. As a further incentive to good conduct, this class, too, might, as in Russia, be allowed to marry, or to bring their wives and families, if already married, along with them, and thereby blot out one of the darkest stains in the convict system of England.

This is not the time nor the place to enter into the details of the organisation of the scheme I have here very briefly and imperfectly sketched. The principle on which it rests is simple and intelligible, and it has this at least in its favour, that it has been tried elsewhere, and is at this moment in successful operation, while our own system has notoriously and avowedly failed. This ought to be sufficient of itself to induce us to give it, at least, a fair trial.

The locality recommended for the experiment is open to no valid objection, so far as I am aware, and has, on the other hand, many undeniable advantages in its favour.

* The limits of the present paper will not allow of so full a detail of the mineral and agricultural resources of this part of the country, for the support and beneficial employment of a population, as could be wished. The reader is referred to another paper, in this *Journal*, by the present writer (published March 1, 1861), in which this part of the subject is discussed at great length.


GREENLAND
LABRADOR
BAFFIN'S BAY
HUDSON'S STRAITS
HUDSON'S BAY
YORK FACTORY
POLAR SEA
BRITISH AMERICA
CANADA
L. SUPERIOR
FT WILLIAM
RED RIVER COLONY
WINNIPEG LAKE
YORK RIVER
NELSON R.
CHURCHILL RIVER
CUMBERLAND
SASKATCHEWAN R.
DEER R.
SWAN R.
ATHABASCA L.
SLAVE L.
BEAR L.
PEACE R.
LR SLAVE L.
ELK R.
MACKENZIE'S RIVER
FT SIMPSON
ROCKY MOUNTAINS
BRITISH COLUMBIA
VANCOUVER ISLAND
BOUNDARY LINE
UNITED STATES
RUSSIAN AMERICA

As compared with Australia, the Falklands, and other islands in the Pacific which have been suggested, Hudson's Bay, which is within ten days' steam of England, may be said to be at our very door, and although accessible during a few months only in the year, this is an advantage rather than otherwise, as convicts once settled in the country will be precluded from all possibility of escape—having on one side an ice-encumbered sea, impracticable for navigation during the greater part of the year, and on the other an impassable wilderness of many thousand square miles in extent, cutting off all intercourse with the settlements on the south and west. It is, in fact, a great natural prison, marked by the hand of nature for a penal settlement, and capable of absorbing in its vast area the criminal population of England for centuries to come.

As regards the Hudson's Bay Company, that body has expressed its willingness before a recent Committee of the House of Commons to surrender any portion of the territory under its jurisdiction which may be required for public objects. The company's license of exclusive trade expired in 1859, and the Duke of Newcastle, with wise foresight for the public interests, has declined up to this time to renew it.

The few scattered remnants of the aboriginal population now existing in the part of the country proposed for settlement can readily be removed, and with great advantage to themselves, to the Red River Colony, where there is at the present time a flourishing Indian settlement, composed of families drawn in this way from all parts of the Hudson's Bay territories.

I have heard it suggested as a possible objection that the selection of these territories for a convict settlement might possibly give umbrage to the United States or to Canada. Such an objection can only proceed from those entirely unacquainted with the geography of the American continent. The distance between York Factory and the northern extremity of Lake Superior (itself some hundreds of miles beyond the most advanced settlements in Canada), by the usual travelled route, is 1,385 miles; the distance of the same place from St. Peter's, in Minnesota, 1,894 miles.* The distance of Fort Simpson on McKenzie's River from either of these places, is upwards of 3,000 miles. To talk of the contamination of a convict settlement, separated by such an interval as this, would be, as has been well observed, as "if the people of Odessa were to raise their voices against a penal settlement at Archangel," or those of London to denounce the danger to their morals from a similar establishment in the Crimea, which would, in truth, be less absurd. No such complaint could be raised in earnest, and if raised by way of "cry," it must, with all respect, be disregarded. With reference to the small community at the Red River, the proposal here advocated has been repeatedly brought before them through friends of my own in the colony, and I have never heard anything but approval of it as a measure, which by opening up a market for its productions, is well calculated to promote the prosperity of the settlement in common with the whole of the vast territory, in which it is at present like an oasis in the wilderness, the solitary representative of civilization. The lines of convict settlement I propose to establish do not come near this colony, although supplies might be readily obtained from it, if necessary, at all times without difficulty. The valleys of the Red River and the Saskatchewan, through which lies the great highway of communication between Canada and British Columbia, should be reserved for voluntary migration, and it forms no part of the present plan to send convicts there, although they would of course be available for the construction of any public works which might be deemed necessary, either there or in the contiguous countries of Canada or British Columbia.

* The following table, quoted from an official survey, and given in evidence before the Committee of the House of Commons, on the Hudson's Bay Company, is extracted from their Report, p. 130:—

DISTANCES BETWEEN YORK FACTORY AND ST. PETER'S, MINNESOTA.

	Miles.
From York Factory to Lake Winipeg	382
Across Lake Winipeg to mouth of Red River	300
From mouth of Red River to Pembina	163
Prom Pembina to St. Peter's	1049
Total	1894

DISTANCES BETWEEN YORK FACTORY AND LAKE SUPERIOR.

	Miles.
From York Factory to Lake Winipeg	382
Across Lake Winipeg to Winipeg river	300
Winipeg River to the Lake of the Woods	175
Across the Lake of the Woods	75
Thence to Lake Superior	453
Total	1385

DISCUSSION.

Mr. S. Redgrave said it was with great diffidence he ventured to obtrude any observations upon the meeting. He had listened with great interest to Mr. Isbister's arguments in favour of Hudson's Bay as a colony suitable for convicts, and he regarded that proposition as the principal point in the paper, as it had not touched upon the question, so far as he had observed, of how to dispose of the convicts upon the completion of their sentences. The Russian system had to some extent been advocated by Mr. Isbister; but if they were to hold out the prospect that convicts were to be provided with a plot of ground, a house, a horse, two cows, and agricultural implements, in addition to exemption from taxation, there would be plenty of candidates for such excellent government appointments, and there would certainly be no lack of convicts. Then, again, under the Russian system, the wives and families of certain classes of offenders were allowed either to accompany them in their expatriation, or to join them after a period of time. He did no know how it was possible, under any system of English transportation, to introduce honest women into the convict settlements; in fact, under any system that had hitherto existed, it had been found impossible to do so. When a number of women were shipped to one of those colonies, all that could be done was to put them together into a sort of barrack, and a convict, upon his good behaviour, might obtain a holiday to go and choose a wife for himself; but how, under the present circumstances, these women could become honest wives he was at a loss to imagine. He considered the whole question was beset with many difficulties. It was very well to talk about the employment of convict labour in the making of roads, &c.; but it was well known that the work done by a convict was only about a fourth of that performed by a free labourer. When the convict was set to work, his object was to do as little as possible. They must have guards and overseers to watch the convicts, as well as soldiers to protect the civil staff; and in his opinion nothing led to greater demoralisation amongst soldiers than the employment of them in penal colonies, and he believed strong objections against such an employment would be raised by any commander-in-chief. He thought it his duty to bring forward these difficulties, and in pursuing the subject further, many others might be mentioned. Upon the question of the almost impossibility of the convicts escaping from Hudson's Bay, and finding their way to Canada and America, they had had accounts of escapes of convicts effected under difficulties greater than had been shown by Mr. Isbister with regard to Hudson's Bay, and in that way all the evils of a desperate set of men getting loose upon society, which had always been a subject of complaint in our colonies, might be repeated. The whole question of transportation to a penal settlement was surrounded with grave difficulties. With regard to Hudson's Bay being a suitable colony for such purposes, there was no doubt that the points urged in the paper were worthy of careful consideration; but when they had planted a colony of English convicts there, what were they to do with them when the period of their trans-

portation was expired? There was no means of providing for their future course of life, and they could hardly be established in Hudson's Bay to farm the land. Free colonists had an objection to the employment of liberated convicts, and their object had always been to obtain paid labourers of a different class, whilst to the convict labourer, as he had before remarked, there was but little inducement to work. He would only add, that in the event of a return to the system of transportation of criminal offenders, attention should, in his opinion, be directed to providing them with the means of future existence, and of leading a reformed life after their sentences were expired.

Mr. W. HAWES said he was sure no apology was necessary from the author of this paper for having introduced the very important subject of convict colonisation to the attention of this Society, for he did not know any body of men whatever who were more interested in the proper administration of the penal laws of the country than the members of the Society of Arts. They had property exposed in every way, and at all times, to the depredations of the thief; their personal safety was specially in danger from the necessity which business enforced upon them of being out at all times and in all manner of places, and therefore those present must consider this a very proper paper to be submitted to them, and one in which they must all feel the greatest possible interest. The arguments used by Mr. Isbister were based upon two assumptions; first, that the present convict system had entirely failed; and, secondly, that the only course now open to the country was a return to transportation, in order to dispose of our criminal population. He demurred to both these propositions. He said that other treatment than transportation had not so entirely failed, and they had ample evidence before them that, under proper care and discipline, and under the administration of proper persons, there were means of treating the criminal population in such a manner as to place all notorious and dangerous criminals beyond the pale of society, and only to release those who, after a season of severe penal servitude, had proved themselves able and willing to earn an honest livelihood, after their period of confinement had passed. If it were the fact that those means were practically in existence, then the expense of transporting the criminal population, and all the moral evils attending it, to a place such as had been described to them that evening, and recommended to them by comparing it with Siberia, was unnecessary, and he believed it would be against the feelings, the prejudices, and the natural instincts of the country that they should endeavour to create a settlement upon British territory upon the principle adopted by Russia in establishing the great penal colony of Siberia. He believed they had only to look carefully at the working of the penal system now in force in Ireland to be satisfied that if the same amount of energy and talent were applied to that of England, the same, or nearly the same, results would follow. In Ireland the criminal population was steadily decreasing. When released from prison after the full period of incarceration, they found that the great mass were absorbed and employed, and there was even a demand at the prisons for those who had worked out their sentences; but the reverse was the case in England. Why, then, did this difference exist between Ireland and England? First, he believed, because there was not that conviction in the minds of those in authority in England of the soundness of the principles established and practically carried out in Ireland, which was absolutely necessary to insure success. Moreover, our prisons were conducted upon no fixed principles of penal discipline, but were all more or less subject to the opinions, feelings, and perhaps the somewhat capricious exercise of their powers by the local magistrates, and were not governed by one inflexible rule, which ought to apply to every prison, and be enforced against every person who deserved to be confined for a long period, as having thereby proved himself unfit to be at liberty. In Ireland the system of penal servitude had succeeded; in England it manifestly had to a great extent failed; in the one case it proved good, in the other bad. In the one case, the criminal population was turned loose upon society after short imprisonments, again to perpetrate other and more aggravated depredations; in the other case, long imprisonments and other checks upon the prisoner afforded him an opportunity of showing his improved character, and his desire to abandon his evil habits, and to gain an honest livelihood. The great object should be to withdraw our criminal population in the earlier stages of crime from society. That was the course which the statesman and philanthropist would pursue, and not by neglect of our pauper or poor children, to leave them to be educated in crime, and then to become fit subjects for transportation. We ought, in the first place, to look to the means of preventing this criminal population growing up, but as that could not be wholly prevented, we ought to treat all those who had been in custody many times as persons dangerous to society, and lock them up; and if that was not sufficient, they ought to endure some bodily punishment. They ought to feel that which they had inflicted upon the innocent part of the population. He held that we had no right to throw into our colonies the refuse population of the mother country, or to deteriorate the morals of our colonists by placing amongst them hundreds and thousands of the vilest of our criminal population, so as to reduce in a great degree the moral standard of the colony to which we sent them. But they had been referred, in the paper, to America and New South Wales as evidences of the success of the transportation system, but he would ask, were there no evidences to the contrary? was the success, as tested by results, so entirely complete? It was now nearly 100 years since they ceased to transport criminals to America, and he would ask whether they might not trace many of the worst phases of the American character to the seeds that were sown by the thousands and tens of thousands of our criminal population who were sent to that country? Might we not infer that that criminal population had reproduced in another generation many of their vices; and was not the deterioration in many respects of the Anglo-Saxon race in America fairly attributable to this vicious element? They could not be insensible to the difference between that race and the population from which they had sprung, and of which we were so proud in this country, and all those who studied the character of our Australian colonies would see, with regret, tendencies to the same vices in those colonies which had been the recipients of our convicts that they saw in America, arising from the transportation for half a century of our criminal population to that country. He said there was every possible reason why they should not transport their criminals, but keep them here under proper regulations, and enforce obedience to the laws of this country, and if the criminal, after ample warning and punishment, still remained disobedient to them, then he should be held in custody, if necessary, for life. By what means, then, was this to be done? They could trace a portion of the evils of the present time to the altered criminal legislature of the last few years. By an Act of only recent standing, criminals who had been convicted five or six times, could, by obedience to prison discipline, obtain the remission of a great part of their sentence, without affording any evidence whatever of their power to resist temptations to crime when out of prison, or the commission of similar offences to those for which they had already suffered. A criminal convicted and imprisoned many times before, might commit a series of smaller offences, or even grave offences, to which he might plead guilty before the sitting magistrate, and might be adjudged for each of such crimes a few weeks' imprisonment, and be let out again improved in crime by his prison associations, and ready at once to fall back again into a fresh career of villiany. On the other hand, if a man's previous convictions were properly considered at the time of his punishment, (and no criminal ought to be sentenced afresh, no matter, com-

paratively speaking, how trifling the crime with which he was charged, without due consideration of his former offences) it ought not to be within the power of any one magistrate, or even of magistrates in petty sessions, to send such an offender to prison for a short period, but he should be obliged to send the case to the assizes or the sessions to be tried by a jury, and the judge should then apportion a sentence, not for the offence immediately committed, but for that and his former crimes, which proved him to be an incorrigible criminal, and a man unfit to be at large, and who, therefore, ought to be confined for a longer period than would be adjudged for the simple crime for which he was then being tried. The next thing required was the perfect certainty that the sentence adjudged would be enforced to the letter, as regarded liberation in England, and even as regarded any other country, unless such an amount of work had been done, and good conduct had been recorded, in favour of the prisoner, as would entitle him to a remission of his sentence, but only upon some fixed principle by which every governor of prisons should be guided, without the matter being left to the caprice of a single officer. They required, also, that a committing magistrate should carefully consider, not only the crime for which the prisoner was brought before him, but the number of times he had been convicted. Thus, instead of remission of sentence following from mere good conduct in prison, decided upon by prison officers upon feeling rather than upon facts, it should follow from that and the amount of work the prisoner had done, and the money he had thereby earned—not work restricted by prison hours, but every man determined to work for a remission of his sentence, should have the opportunity of working longer hours, and thus of proving industrious habits, and what he earned by his industry should form a fund, not to be given over to him in money on his release from prison, to go back to his former associations, but to aid him in emigrating to another country, each man choosing for himself the country he would go to. The released prisoner would then take his departure from his native country as a free emigrant, holding a testimonial of a character earned by a long period of labour and industry, obtained under most trying circumstances. Upon the present system, however, they introduced the element of hope for a remission of sentence from a mere external and, it might be, hypocritical observance of certain forms and ceremonies which there was no means of properly testing so as to know whether it sprang from the heart, or was only a sham put on whilst in prison, the criminal being well aware that if he went through certain formal observances, and pleased his officers, he would obtain a remission of his sentence.

Mr. Robert Dawbarn, as a country magistrate, wished to state that the fact was not, as mentioned by Mr. Hawes, that one magistrate decided cases of the nature he had referred to, for in petty sessions the cases were adjudicated always by two magistrates, and very frequently by more. In London those functions were performed by one stipendary magistrate alone. There were three points of view from which this question ought to be regarded. First, the conviction and sentence of the criminal; next, the mode of carrying out the sentence; and thirdly, the result of the corrective influence of the administration of justice. Although justice was retributive, the Christian man neglected his duty if he did not look to the future improvement of those who came under its influence. The primary object of punishment in this country was to effect the reformation of the criminal. In 1853 a great change came over the practice of the law in the abolition of transportation to penal colonies abroad, and the substitution of penal servitude in the home prisons. Judges at assizes, and magistrates in quarter sessions, sentenced convicted prisoners to terms of penal servitude varying from three to four years, and ten years only in cases of extreme atrocity. The introduction of penal servitude at home gave rise to a system of prison discipline by which it was hoped to effect an earlier reclamation of those who had fallen into habits of vice, and they had heard from Mr. Hawes the manner in which the system had worked in Ireland; and in reference to the concluding remarks of that gentleman, he would state that when he was at Mettray, in Tours, he was very much struck with the fact that the chaplain of the prison (it being a Catholic country, he was also the confessor) never interfered with the carrying out of the sentence on the prisoners, and he thought that would be a considerable improvement in this country. In relation to the effects of penal servitude, Mr. Dawbarn expressed his opinion that, as far as his experience in agricultural districts went, they had not been generally of an unsatisfactory character, and he knew of several instances in which persons released from penal servitude had become useful members of society. Happily, in the rural districts, they were nearly exempt from those cases of desperate atrocity and violence which had recently occurred in the metropolis, and which were always found to be more prevalent in large towns. He thought it his duty, as one connected with the administration of justice in the rural districts, to make these few observations in reference to what had fallen from the last speaker.

Mr. P. L. Simmonds said he must differ entirely from the opinion laid down by Mr. Hawes, that the policy of, or necessity for, transportation, and the nature of the treatment of our criminal population at home, as dwelt on so much by the last speaker, was a right and proper one to be discussed before the members of a society whose objects were set forth to be the Promotion of Arts, Manufactures, and Commerce. The discussion of this phase of the subject was more fitted for the meetings of the Social Science Congress, or some judicial assembly. But under the title of Mr. Isbister's paper it might, in its colonising aspect, be taken up by the members. He had listened attentively to the address of Mr. Isbister, but he must say he could not fall in with the very sanguine views of that gentleman as to the suitability of the Hudson's Bay territories for the location of convict labour. There appeared to him many objections, among the most prominent of which were that no profitable result could ensue from employing convicts there. They could not be, as in other cases, the pioneers of civilization in clearing forests, forming roads, bridges, and other public works, unless they could be turned to the formation of a convenient overland track of communication and resting posts for the great highway required through our North American possessions to the British Columbia gold fields and the Pacific shore. Mr. Isbister had told them little or nothing of the indigenous or available resources of the territory. There was no fuel to be obtained, and the woody regions were very limited. Where was the precise spot where the convicts were to be located? Was it to be the "Barren grounds" of which he had spoken, York Factory, or the Valley of the Saskatchewan? It was all very well to point on the map to the vast extent of territory, stretching over thousands of miles, studded with rivers and lakes, and to speak of its admirable capabilities as a prison, but the convicts must be fed and sheltered, and guarded, and employed in some way. Were they to be taken into the service of the Hudson's Bay Company as hunters and fishers, or to become squatters, as suggested, with their wives and families, horses, and cattle in the bleak wilds of North America, where their own energies would certainly not enable them to raise sufficient to support life? The climate would forbid them raising anything for their own support, and all supplies would have to be introduced, like themselves, at great cost. Again, they had heard not a word as to the expense of transport and maintenance of the convict settlement. It was easy to speak of a short sea-passage of only ten days or a fortnight to Hudson's Bay, but this was the smallest part of the entire expense. Allusion had been made to Siberia as furnishing a useful precedent. Labour in the mines was pointed out as occupation for the criminals, but what mineral resources were to be found in the Hudson's Bay Company's hunting countries? Was t anticipated that a new gold-field would be discovered

there for the especial benefit of the most hardened of our criminals? Mr. Isbister had argued that it was impossible to escape from such a country. But surely he must know that what Arctic travellers and the Company's hunters could do, alone and unaided, a determined man, seeking his liberty, and with the woods and rivers at his command, could as easily do, travelling towards the settled districts; and to suppose a sufficient guard could be maintained in such a country was preposterous. It was very questionable, also, whether the Red River settlers, the Canadians who were so desirous of carrying their frontier further north, or the Americans, would be favourable to the introduction of a permanent convict settlement there. He was by no means an advocate for transportation, if any more effectual means of repressing aggravated crime could be found; but he thought that there were many more suitable spots, such as British Honduras, the parts of Western Africa lately pointed out by Capt. Burton, the Falkland Islands, and other localities, to which the deportation of convicts might be more advantageously directed. In making these few observations he had no desire to depreciate the industry and zeal of Mr. Isbister in bringing a country with which he had long been intimately identified before their notice.

Mr. G. W. Hastings begged to offer a few observations upon this paper, and would endeavour to keep as closely as possible to the subject treated of, and avoid the wider question of the details of the treatment of convicts in this country. At the same time, it was hardly possible to deal with a paper which advocated penal settlement for convicts without considering in some measure what the treatment of the convicts themselves ought to be; because, unless it was first shown to be desirable to send convicts to penal settlements, it was idle to argue as to any particular place being suitable for such an object. He must say, with all respect to the author of the paper, that whatever might be the knowledge he possessed of the Hudson's Bay territory, and however interesting the information he had conveyed respecting it might be, yet it was evident that he was not so well acquainted with the treatment of criminals in this country, with the legislation that had taken place upon it, or with the official inquiries which had been made concerning it. With some boldness, he thought, Mr. Isbister had cast upon so eminent a statesman as Sir Wm. Molesworth, and those who were associated with him on the committee of 1837, the inuendo of having been agitators to prevent the transportation of convicts to Australia.

Mr. Isbister begged to state that the passage alluded to was a quotation from a writer in the *Times* newspaper.

Mr. Hastings went on to remark that any one who had read the evidence given before the Transportation Committee, and also the evidence given long before that committee made the report upon which the government came to a decision on this question, must come to the conclusion that that decision was a sound one. Mr. Isbister had told them it would be desirable to establish a penal colony in Hudson's Bay because it so closely resembled the Russian penal settlement of Siberia. But there were several important differences between the two cases. In the first place, Siberia abutted upon the territory of Russia proper, and therefore could be colonised by others than convicts from the population of Russia; and besides, a great portion of the convicts sent there were not of the class usually sent to our penal colonies. He imagined Mr. Isbister would hardly propose that when Lord Derby came into power he should consign the opposition to the Hudson's Bay settlement, or that the Whigs should deal in a similar manner with the Tories, but that course was the one adopted in Russia. A large portion of the present population of Siberia was descended from the best families of Russia and Poland, and possessed some of the most vigorous blood that was to be found in those countries. The difference was essential for these reasons. The great curse of a criminal convict population was the difficulty of dealing with them on account of their weak moral and physical organisation. The great majority of the convict population were fit for nothing. They were weak mentally and bodily, and of depraved habits, and out of such material it was impossible to found a flourishing colony; and he ventured to say their learned chairman, or any other man who had gone on circuit, or had been judicially brought into contact with the criminal population, would bear out the truth of this statement. To tell them that a class of people of that description could be sent into a severe climate like that of Hudson's Bay, as a means of colonisation, was to ignore all the experience that had been obtained on the subject of transportation. If they referred to the speech of Sir George Grey in the House of Commons, in 1857, when he introduced the Bill for penal servitude, they would find that he then stated that one of the chief difficulties they had to grapple with was, that the great majority of persons sentenced to transportation were not fit to be transported at all, and that it was useless to send them out to penal colonies. If that were the case when convicts were sent to the mild climate of Australia, what would be the state of things if they sent them to a climate like that of the Hudson's Bay territory? It would be impossible to send them there in the hope that they could work hard, retain their health, or be of any service to the community. He thought that of itself was sufficient objection against making a penal settlement of Hudson's Bay. But there was another objection against it. Mr. Isbister had said no one who was not entirely unacquainted with the geography of North America would suppose that the convicts could ever make their way into Canada and the United States. He thought that was rather a rash assertion, because it was given in evidence before the Transportation Committee, that a considerable portion of the convicts of Western Australia did somehow or other drift through into the other colonies of Australia, and the great opposition of the colonists of Victoria—who never had any convicts sent to them—was, not that it was proposed to send convicts there, but that they should be sent to any portion of the Australian colonies, on the ground that they would be sure to find their way there, and they did not see why England should inflict upon them a population which she would not keep herself. Upon the subject of transportation itself he would say that there was a large portion of convicts to whom it never could apply; and when they were sent out, the benefit which was expected to this country did not result; we did not get rid of them. When they talked of sending convicts to Siberia, the Russian government sent them there for life; and if it was supposed that the House of Commons was prepared to pass, and the Government to sanction, an Act for transporting every person convicted of an offence for life, there might be some reason in the argument for sending convicts to a penal settlement. But they were not generally sent for life. An immense proportion were only for seven years; fifteen was considered a severe sentence, and convicts were continually coming back to this country, not only those whose sentences were expired, but also those whose sentences were not expired. He was himself comparatively young at the bar, but he had seen convicts tried for returning before the expiration of their sentence. The fact was, transportation to penal colonies did not answer the end for which it was established. It would not rid us of our criminal population if it was renewed to-morrow. Instead of reaping the advantage of getting rid of them, we should find them in a few years nearly as troublesome as they were at the present moment. He objected to the whole system of penal settlements, and he would tell them why. In the first place a penal settlement, in the strict sense of the term, was nothing more than a large prison some thousands of miles distant. It was nothing but what they might have in this country under much better supervision, under the eye of the press, the best possible machinery for keeping officials to their duty;

and, in the next place, it was a much more expensive way of keeping up a great prison than at home. First of all there was the expense of sending the convicts out; then they had to send soldiers as guards and people as warders, and unless they made penal settlements self-supporting—which had never yet been done—they would have to supply them, if not with food, with most other necessaries. Any one who looked to the evidence given before the Transportation Committee, and saw the expense of the Norfolk Island and Van Dieman's Land penal establishments, would understand what price must be paid for carrying out the transportation system. With regard to the question what was to be done with the convict upon the expiration of his sentence, it was of course easier for him to obtain a livelihood in a country where labour was in demand, than at home, where the labour market was already glutted. What they wanted was to set the convict free in a community where there was independent capital and a demand for labour, and that would never be the case in penal colonies. If they wanted localities in which liberated convicts could obtain a livelihood, let them not be penal colonies, but places where there was capital to encourage the employment of labour, and there were such colonies in abundance; and if it were not for the absurd system of forcing our criminal population upon reluctant communities, he believed Australia and the Cape of Good Hope would have been ready to receive them as colonists. Western Australia now took a number of convicts every year from Ireland, it being understood that only the promising characters were sent, and not those whose reformation was hopeless. For the reasons he had stated he was strongly opposed to penal colonisation. It would not answer the purpose sought, and if repeated would again prove a failure. He called upon this Society, as upon all other similar bodies in the country, to face the difficulty of dealing with this question in a manly spirit, and not to be led away by a temporary panic into measures of error or injustice they would hereafter regret. Let them look at the weak points of the present system, and endeavour to remedy them to the best of their ability, and he was quite sure as efficient means would be found in this country of grappling with crime as it was possible to find in any other quarter of the globe.

Mr. John Dillon thought it somewhat unfortunate that this question should have been discussed this evening almost entirely in relation to one particular aspect of it. It was seldom that he had to differ from his friend Mr. Hawes, but he did so on this matter, inasmuch as he (Mr. Dillon) did not consider that the system of penal colonisation had entirely failed; and with reference to the system pursued in Ireland, of which Mr. Hawes had spoken in such high terms, he did not see that crime had been repressed there in any greater degree than it had been in England. For his own part, he was very much inclined to the system of reformatories for criminals—especially for the more juvenile class of offenders. He trusted he was not more hardhearted than his friend on this question, but he apprehended the object of criminal law was the punishment of the criminal, whilst the philanthropist looked also for reformatory results from the administration of the law. The forms of indictment, the charges given by judges to the jury, as well as their addresses to the prisoners previously to passing sentence, tended to show that the object of the law was the punishment of the offender, and to deter others from crime; but he should be happy to see the reformatory influence exercised as far as possible.

Mr. Taylor would make one remark with regard to the difference alluded to by Mr. Hawes between the cases of English and Irish convicts. He had been in New South Wales, and having had several convicts in his employ, his own experience was, that the Irish were much more tractable servants than the English; and when the former found that there was a strong power at hand to control them, they were more submissive to their lot than the latter. He thought that would partly account for the discrepancy of the results between the English and Irish convict systems. He might add that the majority of the Irish convicts were from the lower classes, who were inured to hard work, and they, for the most part, worked better than the class of convicts usually sent from London and other large cities. The great object should be to take the best possible steps to prevent the development of crime in youthful offenders, and save them from growing up to be garotters and murderers. He thought it well became the philanthropic members of this Society to give this subject their attention with a view to prevent the development of crime.

Mr. Isbister, having been called upon by the chairman to reply, observed that he agreed with one of the speakers that the discussion had somewhat wandered from the object of the paper, which was not so much to show the best mode of punishing criminals, but—on the assumption that the common sense of the public had by a large majority out of doors, if not in that room, pronounced in favour of transportation,—to point out a territory which appeared to him well suited for carrying out, in a much more complete and permanent manner than had yet been attempted, a comprehensive scheme of penal colonization. It seemed to be forgotten by most of the speakers that transportation was not even yet an obsolete punishment. He must repeat what had been stated in the paper, that after a criminal had passed through the reformatory stage of his punishment in England, it was open to the Government to discharge him on a ticket of leave either at home or in the colonies, Western Australia being unhappily now the only colony available for the purpose. The committees of the House of Commons and of the House of Lords, which sat in 1856, had recommended, to quote the language of one of their reports, a "continuation of the sentence of transportation so far as Her Majesty's dominions may afford safe and proper facilities for that purpose;" and they seemed, so far as he could gather from an examination of the evidence, to lament the want of other suitable places to which convicts might be sent, as Western Australia appeared to be capable of absorbing so small a number. It was from a desire to meet this want that he had brought before the Society the claims of a territory where a new experiment might be made under circumstances which held out greater prospects of success than had hitherto attended our efforts in other quarters. The subject was so wide a one that it was quite impossible, within the limits of a paper to be read and discussed in a single evening, to go into minute details of plans as respected the modes of dealing with the convicts when they reached their destination, the expense of maintaining them, the cost of their supervision and guard, or the resources of each particular district in that immense area of country. These details would form more fittingly subjects for future consideration. For the present he would merely observe, that whether we kept our convicts at home, or sent them abroad, whether we sent them to Hudson's Bay or to Australia, or to some other colony, they would equally require guards, maintenance, and supervision, involving necessarily a heavy expense. He did not profess to find a place where these could be dispensed with, but he was prepared to maintain that the expense in the Hudson's Bay territory would be less than in Australia, while its capacity of absorbing our criminals was beyond all comparison greater. So far, therefore, there was a clear gain in the selection of Hudson's Bay, not to dwell upon the other considerations urged in the paper, namely, the proximity to this country, the difficulty of escape of the criminals, and, finally, the advantage of having a locality, entirely under the control of the Home Government, where transportation could be carried out for a long time to come, as a permanent system of punishment, and not, as heretofore, as a mere temporary resource dependent on the co-operation of the inhabitants of a distant colony. One gentleman had referred to the fact that criminals did somehow or other escape in Aus-

tralia, and therefore there was every reason to believe they could escape easily in Hudson's Bay also. He thought it a sufficient answer to this that the conditions of the two countries were so essentially different, that to reason from the one to the other would be fallacious. We had in Australia—Western Australia especially, a level country, with hardly any deep rivers or lakes to cross, few or no forests to pass through, and, lastly, a climate so mild as to enable a man to live without shelter for as long a period as he could find roots, berries, fruits, game, &c., to subsist upon. In Hudson's Bay, all this was as widely different as it was possible to conceive. First, there was a climate which, during the long and rigorous winter, would be fatal to any one who attempted for any length of time to live in the open air, without shelter; and in the summer there were pathless forests to be traversed, destitute of fruit-trees or other means of sustaining life, and a country intersected by numerous deep and impetuous rivers and extensive lakes and marshes. The man who could escape in Australia might undoubtedly make the attempt in Hudson's Bay, but he would undoubtedly perish in the attempt. He had, in a former paper, read before the Society, and published March 1st, 1861, dwelt so fully on the resources and capabilities of the Hudson's Bay territories for sustaining a large population, that it would have been simply a repetition of what he had said, to go over the same subject in the present paper. Those interested in the subject would find that part of the question very fully discussed there, and he would ask them to read the two papers in connexion, as so wide a subject as the resources, animal, vegetable, and mineral, of a territory nearly equal in extent to the whole continent of Europe, could not have had justice done to it in a paper like the present, which took up another part of the subject. He would merely observe that along the line of country he had proposed for convict colonisation, which would be found clearly indicated on the accompanying map, the experience of the establishments of the Hudson's Bay Company, now stationed there, had proved that in parts of the country wheat could be raised, and in others barley, oats, and the harder kinds of grain, while potatoes, turnips, and other vegetables, would grow in all parts not in immediate proximity to the sea, so that there would be no difficulty, such as one of the speakers had apprehended, in raising the means of subsistence. The fact that the Hudson's Bay Company had stations all along the line of communication, which were entirely self-supporting, and which of course could be multiplied if necessary, was the best answer to the objection that convicts settled there would have to be maintained from England. Some assistance they would of course require in the first instance, but any deficiency could be readily supplied from the Red River settlement, where flour and other provisions could be obtained at a much cheaper rate than in this country, and sent on with great ease along the line of water-communication he had described in the paper. He had been quite prepared to find some prejudice against the Russian system of deportation to Siberia, simply because it was Russian; but with all respect to those who urged the objection, this was not an argument. They were not there to consider "prejudices" as such, but whether they were well founded; and he maintained that if Russia had solved the problem we had failed in, the best thing we could do would be to imitate her. He had pointed out a territory where the system adopted by Russia could be carried out, as he believed, with equally successful results. It might be quite true that transportation to Hudson's Bay would not be what transportation to Australia had been,—the pioneer of free emigration. But against this we should have to balance the advantage that if free emigrants would not be attracted in large numbers to Hudson's Bay to benefit by the labour of the convicts, neither would they, as in Australia, be able to upset, at any time they pleased, our whole system of penal legislation; and that we should have here what we had always desired but had never been able to secure, a permanent penal colony instead of a temporary one. As for the objections which had been urged that there would be no means of disposing of the convicts after their term of sentence had expired, that they would be attracted by the prospect of grants of land, that there would be no great object of national utility to which their labour could be applied, &c., &c.; there was no answer he could give so effectual as the example he had pointed out, of a great and successful penal colony subsisting for the last two centuries, and likely to do so for as many more, where precisely the same class of difficulties had no doubt arisen, and, as they all knew, had been successfully overcome. There was the thing done, and no arguments he could use would be a more effectual answer to these objections than that. He had in his former paper pointed out an object of very great national importance, namely, the opening up of a communication between Canada and British Columbia, by which our possessions in North America, on the Atlantic and the Pacific, might be more intimately united and consolidated; and here, therefore, not to mention any others, there was a great national undertaking of undoubted utility, in which all the disposable convict labour we had might be absorbed for many years to come.

The Chairman said it was now his pleasing duty to ask them to authorise him to return their thanks to Mr. Isbister for his valuable paper. He would only trouble them with one or two observations on the subject under discussion. Mr. Isbister seemed to have thought that his paper did not involve the question of penal servitude at home; but it appeared to him (the Chairman) that it did so, and he thought Mr. Hawes was quite in order in seeking to show that, inasmuch as he regarded transportation as unnecessary, it was useless to look out for another colony to which convicts should be sent, and that they could be satisfactorily disposed of at home. Whether that opinion was correct or not, it was not now necessary to inquire; but he thought Mr. Hawes was fairly justified in saying that the punishment at home had failed in producing the results which had been hoped from it. He could not say that secondary punishment at home had been effectual; he thought it had failed in the large majority of cases. Whether that was owing to the imperfect manner in which it was carried out, the imperfections of local administration, or a misconception of the means whereby punishment could be made effectual at home, he could not say; but he differed from his friend Mr. Hawes in the contrast he had drawn between the English and the Irish systems. He thought the Irish system dealt with a different class of criminals to those in England. It dealt with rural criminals to a large extent—persons not brought up in the atmosphere of large towns, born and educated in crime. That could not generally be said of Irish criminals, but could largely be said of the English criminals; therefore, the discipline which had been found effectual in the one case, might fail in the other, and that might account in a great measure for the difference of results in England and Ireland. This was in itself one of the most important questions that could be submitted to an English audience. It was only during a very few years that penal servitude had been tried in this country, and that criminals had been discharged after certain periods of imprisonment; yet they saw in that shor space of time the condition of the criminal population had become greatly worse; that the large towns were more dangerous, and that the present punishments had not been found to be a "terror to evil doers." He had himself occasionally to do with the administration of justice, and only the previous week a woman was brought before him who had been in prison no fewer than fifteen times. She was then convicted of two larcenies. What was to be done in such a case? She must either be sent to penal servitude or to the House of Correction again, and that man must be of a very sanguine temperament who thought a person who had been in prison fifteen times would be reclaimed on the

sixteenth occasion. He had been told that the great desire of such criminals was to get into a Government prison, and he was informed by the Chairman of the Middlesex Sessions last week that their warders had been outrageously assaulted by prisoners whose object was to get into one of the Government penal prisons. That did not settle the question, of course, because he was aware the discipline of prisons might be improper, and from the mode in which the criminals were treated such a result might have followed. It was a subject upon which very much might be said. The criminal law of the country had of late years been greatly humanised; they had to deal in the present day with a large amount of sympathy towards criminals, and the man who devised the means of making secondary punishments most effectual would confer a great benefit on humanity. He feared if this could not be done recourse would again be had to the punishment of death, a measure which was much to be deprecated. He thought that at the present time this subject was of special interest, and that the Society was particularly indebted to Mr. Isbister for having brought the question so ably before them. He begged to propose a vote of thanks to Mr. Isbister.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 28th inst., a Paper by Mr. T. A. Masey, "On the Best Means of Establishing Electrical Communication between Great Britain and America," would be read. On this evening W. R. Grove, Esq., Q.C., F.R.S., will preside.

AWARDS OF MERIT AT INTERNATIONAL EXHIBITIONS.

(*Continued from page* 152.)

In August last the Council of the Society of Arts issued a letter, inviting the opinion of the Jurors, the Commissioners for the Colonies and for Foreign countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and requesting replies to the questions given below, with the intention of embodying the answers in a public report.

AWARDS OF JURIES.

1.—Are you of opinion that Awards for Merit, by medals or otherwise, in International Exhibitions, are desirable?

2.—State the reasons for your opinion.

3.—Ought Works of Fine Art and Designs to be excluded from the awards?

4.—Can you suggest any better method than the appointment of jurors for making the awards?

5.—Can you suggest any improvement in the constitution or proceedings of the juries?

6.—Is any appeal from the decision of the juries desirable?

7.—If you think awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?

8.—Have you any further suggestions to offer on the subject?

The following is a summary of the replies received. The figures attached to the replies correspond with those of the questions:—

Septimus Piesse (Piesse and Lubin), Exhibitor, Class IVd. 1. Highly desirable. 2. Men at all times and in all countries, of every class and grade, delight in honour and awards. Degrees of M.A., D.D., &c., are awards to merit. In the army rewards are given for merit, and vary in value from the corporal's stripe to the field-marshal's baton; so also in the navy, from a first-class boy to the admiral. In political economy it is a rule to reward merit with power and rank. The church gives rewards to meritorious disciples, from a living to a bishopric. In fact our whole actions of life are to work for and receive reward, not in this life only, for we are promised it hereafter. 3. Yes. 4. No, provided (*a*) that jurors are not pressed to give opinion upon subjects beyond their capacity; hence careful subdivision of articles is very necessary. (*b*) That no jury consist of less than nine or more than thirteen. 5. The chairman of the jury should be appointed by her Majesty's Commissioners; of the remainder, one-half should be exhibitors, the other half non-exhibitors; all to be nominees of exhibitors, the chairman excepted. 6. The jurors appointed should represent as manufacturers or persons of known ability, the class of goods submitted to their examination; such jury should be known as the trade jury. 7. There should be a jury of each class, having an independent and higher function than the trade jury, and denominated the class jury. The class jury should consist of one-half professional men; the other half merchants, or manufacturers of the articles under their jurisdiction. The professional half should be appointed by her Majesty's Commissioners; the remainder by the trade jury. The principal functions of the class jury should be to form a court of appeal for dissatisfied exhibitors in reference to award of space, &c. Class juries should have the power of awarding the second order of merit. There should be four orders of award or merit. (*a*) Chevalier, or other title for life, with pecuniary gift when desirable, received direct from the crown. (*b*) Gold "hoop" award, given by her Majesty's Commissioners, under the advice of the class jury. (*c*) Silver "hoop" award under advice of trade jury, but the gift of class jury. (*d*) Bronze "hoop," or trade jury award. Chooses a "hoop" as emblematical of eternity and a distinguishing badge of honour for civilians—medals, crosses, clasps, &c., being already employed as decorations for other qualities of merit. Each "hoop" should bear an appropriate inscription. To point out four exhibitors in the present instance (1862) as fit recipients for these awards names—H. Bessemer, for his pneumatic steel and iron manufacture—a Chevalier; M. Carré, for his ice-producers—gold "hoop"; — Young, for his paraffin; — Perkin, for his coal dye—silver "hoop"; J. Morgan, for his printing-block producing machine—bronze "hoop." All these persons receive medals of equal value in the present Exhibition. 8. All articles of a similar kind or manufacture should be placed together, come from what country they may. The primary division of space should not be geographical but commercial; it is absurd to see toilet soap and reaping hooks side by side because they come from Prussia, or tobacco-pipes, and pianofortes in juxtaposition, as both of Austrian work. Trade courts should be first formed and then subject to geographical division; we should then find in the Ceramic Court Roman pottery, English pottery, Dresden pottery, Sèvres pottery, &c., &c., &c., and be able to compare them. Processes should be allotted space in the nave and transept on each side. Machinery should be absolutely divided into machinery at rest, machinery in motion, steam; machinery in motion, electrical; machinery in motion, treddle or foot; machinery in motion, spring. Carriages on wheels, when used for passengers of all denominations, rail or road, should be placed together. A distinct space on the ground plan should be left to divide every class so as clearly to show the jurisdiction of the class jurors and the materials of the class. All organs in the galleries; all bells hung up aloft; no water-fountains within the buildings, but in courtyards, &c.; no trade trophies out of their class space.

William Pole, F.R.S., Juror and Reporter, Class XVI.—Does not answer the queries separately, as a

general answer best expresses his views on the subject. Cannot think that any awards are necessary as regards the interests of the exhibitors, believing that they are sufficiently rewarded by the facilities for exhibition, which cannot fail to bring their merits before the public in a way eminently calculated to be honourable and useful to them. Under the system of medals, if they are few in number, and intended to confer great distinction, it is not easy to exclude altogether the effects of interest and partizanship in the decisions; judgment often becomes difficult; and the awards are seldom accepted with satisfaction. On the other hand, if the medals are very numerous they convey no real distinction, their effect being rather to damage the minority who are omitted than to benefit the majority who are rewarded. But, assuming that the awards might be abolished altogether as regards the exhibitors, conceives that, when the Exhibition has a national character, the authorities have a duty to perform as regards the public, which should lead to some expression of opinion on the objects brought together. The object of such Exhibitions is, as the writer takes it, not so much to accommodate exhibitors (in which case they would only be huge bazaars), as to spread general information on the state and progress of the arts and manufactures; and since the ideas derivable from any individual inspection of such a gigantic collection must necessarily be very limited, the public may reasonably expect to be put in possession of some official account of the contents and results of the Exhibition, forming a critical and descriptive summing up, so to speak, of the whole, which should be prepared in an authoritative way, by parties competent to the task, and independent altogether of the exhibitors themselves. This object might be sufficiently attained by a series of official reports analogous to the present jury reports, but having no reference to any awards to exhibitors. If such reports were drawn by competent parties, with due care, judgment, and impartiality, they would answer every public requirement, while all the difficulties of medals, and all the cumbrous and uncertain means for effecting their awards, would be done away. This plan would carry with it, collaterally, a real "honourable mention" of any merits shown, which would doubtless be of advantage to the meritorious exhibitor, but which would be less liable to dishonest abuse for mere puffing purposes than a direct formal award. The appointment of the parties to make these reports would, of course, require much care. The exhibition would be divided into classes, as at present, and a committee of about three well-qualified persons, to arrange the report for each class, would suffice. But the writer has a strong opinion that they should be fairly paid for the time they devote to the work, and fully reimbursed for their expenses, without which he cannot conceive that the efficient services of competent men could be secured, or the responsibility thrown on them which they ought to bear. The system of honorary, irresponsible juries does not work well. The British jurors appointed for the Exhibition of 1862 were, in most cases, gentlemen much occupied in business, whose time was of so great value, that, however desirous to fulfil their duties as jurymen, they could scarcely be expected to subject themselves to the heavy pecuniary tax, both by loss of time and expenses out of pocket, which constant attendance for two or three months would have entailed upon them; hence the attendance of British jurors was generally irregular, and the awards fell chiefly into the hands of the foreign members, who, being here expressly for the purposes of the Exhibition, were able to devote to it their whole time and attention. Sees no reason why works of art and designs might not be reported on in the way he proposes. Thinks also that exhibitors who feel themselves aggrieved by any official announcement, whether of awards or in the shape of a report, should have the power of remonstrating, first to the adjudging body, and ultimately, if necessary, to some higher authority, but if the reporters were paid and responsible, as proposed to make them, this would form the best guarantee for the fairness of their proceedings.

Lord Portman, Juror, Class IIIa.—1. No. 2. Experience as a juror. 6. Certainly not. 7. More space. 8. That the whole subject should be carefully discussed by experienced and unprejudiced men.

E. Rawdon Power, Commissioner for Ceylon.—1 and 2. As far as European Exhibitions are involved, awards, &c., in International Exhibitions, are out of place, and quite unnecessary, and the community at large can hardly require (even if juries do their duty) landmarks of this character to guide them; yet, as regards an Asiatic colony, such as Ceylon, he thinks that such awards, as far as native exhibitors are concerned, are of use and should be continued. Honorary distinctions are much coveted by natives; at some future period such adventitious stimulus may be unnecessary, and may be abandoned with advantage. 3. Should be excluded. 4. The jury machinery of the present International Exhibition, it would appear, is faulty—giving as an illustration the following fact:—The Government of Ceylon directed that the agronomical map of that important colony should be prepared in the colony, and sent to England for the Exhibition; this service was most admirably performed by Captain C. Simm, R.E., the Surveyor General of Ceylon, and his Departmental Staff, and affords a complete history of thr present state of the colony in reference to cultivation, roads, &c., &c. The map is much admired by the public, and admitted to be one of the best in the Exhibition—certainly the best that has been sent from any of the colonies—but its existence has been entirely ignored by the jury; their attention has been invited to the omission, but up to the present time without effect. 5. If awards for merit are to be continued to native exhibitors from colonies and from the continent of India, it would be desirable that at least one member of the jury should be remunerated for his services; this would ensure due attention and regularity—gratuitous services especially are, as a general rule, inadequately performed. 6. In cases of omission, or misconception of the facts, an appeal should exist to the Commissioners, with the view of requiring the reconsideration by the jury.

J. Prestwich, F.R.S., Juror and Reporter, Class IIIc. Remarks chiefly based upon the experience gained as juror at the present Exhibition in Class 3, Section C—Wines and Spirits. 1. Awards for merit by medals, &c., are not desirable. 2. Firstly, the incompleteness and haste of the inquiry. Jullien, in his "Topographie des Vignobles," enumerates 2,900 growths of wine, a number, no doubt, considerably increased since that time (1822). We have no means of knowing the number of proprietors in each area, but it must, in most cases, be very large. Taking even 20, we should have 58,000 proprietors, who may hold in stock the growth of one or more vintages, and whom it may suit, as was found often to be the case, to exhibit samples of several; in some cases as many as 20 sorts. Supposing two to be selected by each exhibitor, the number of specimens that might be brought forward in more complete competition would be 116,000. The number of growers actually exhibiting on this occasion is about 1,500,* and the number of samples to be examined may amount to about 6,000, which, large as it is, represents but partially the great interests concerned. If, again, in each class or district the exhibitors included the principal producers, the jurors might form an approximate estimate of the relative value of their samples, but the series is never complete. Sometimes no first or even second-rate house exhibits, and there is then a tendency for the awards to fall on produce which in fair open market would not be considered deserving of any distinction. Instances a case in which one important district is represented by only 20 exhibitors out of probably 200 houses, and amongst these 20 there is not one leading

* In spirits and liqueurs there are about 1,100 exhibitors.

house whose wines command the best market prices. In another instance a leading branch of the wine trade, embracing 30 shippers of note, was represented by only 3 exhibitors of first rank. With respect to the time allowed to form a judgment, even on the fraction of the general produce exhibited, it is a physical impossibility to grapple with a task of such dimensions within the time allowed to the jurors, or even were that time extended to the whole period of the exhibition. The wine jury at once adopted the plan of forming sub-sections so as to divide and lighten the labour; but even with this limitation the number of samples to be tasted daily was such that no one could pretend to form an accurate and sound opinion on all the various wines under such circumstances, whatever may be the care and attention he might bestow on the inquiry. Secondly, the irregularity of production. Looking at the various countries and climates from whence our supplies of wine are derived, it necessarily happens that a year good in one country will be bad in another; therefore, the exhibitors of wine ordinarily of equal value and quality in two countries, will compete on an unequal footing where they are limited to the same vintage or even two or more successive vintages. Mentions this merely as a minor difficulty. The third and most serious objection is, that the public, who have not the same means as the jurors of knowing the great allowances to be made, are apt to attach a definite and certain value to the awards, to consider them as indicating a relative superiority over such products as are not so distinguished, whereas, it is evident that, besides the liability to error on the part of the jurors from the causes before named—the partial nature of the exhibition—there exists a reluctance or indifference to exhibit on the part of the best makers or growers. Consequently the awards necessarily altogether fall in many cases to second and third-rate products; and in some cases where the district produces only ordinary products, the best of these may obtain an award, although compared with products of similar value from another district they would show an inferiority. This brings us to another question which further complicates the subject. The merit of a wine will depend upon growth, care in making, age, and care in keeping. Each of these essentials has a definite money charge, and the wine has greater or less excellence according to its share in these conditions. It is easy, therefore, for a grower, regardless of expense, on selecting a particular vintage, to excel in some particular class, or on some particular occasion, without being able to maintain that superiority. Only in some instances were the jurors made acquainted with the prices of the wines and spirits, and without this important element, it does seem to be impossible to decide whether the products are such as to deserve or not a demand, for after all the "awards of medals," and "honorary mentions," may be supposed to indicate to the public the selection they may safely follow. Confesses that his experience on the occasion of this Great Exhibition would lead him to disregard in most cases all such marks of distinction. With regard to wines, should first look to general repute and quality; secondly to price; and thirdly to keeping qualities. Of the last two elements, the jurors have no means of judging, and therefore their decision must rest upon an arbitrary basis—one which can never be used in actual life. Nor have the jurors any knowledge as to whether the sample exhibited represents a stock which can be maintained and kept up, or whether it is a small exceptional parcel, made on some particular occasion or on some especial vintage, not available for purposes of supply or trade. It is easy, with such samples in the cellar, for any exhibitor to obtain a medal, while at the same time his general stock used for daily trade possesses no exceptional merit, or may even be of inferior quality. A cognac house, for example, might have exhibited a sample of brandy 50 years old, and as the merit of this spirit depends much on age, it would probably obtain a medal. At the same time the stock of this age might have been limited to half-a-dozen bottles and, irrespective of this particular sample, the ordinary trade stock of the house might be but of third or fourth quality. Gives this illustration because it was to his knowledge nearly occurring. In wines has reason to believe it occurred not unfrequently. One sample was brought before the jurors said to be 100 years old. It was good and well kept, but the quantity must of course have been trifling, and to whom were we to award the medal, the proprietor who had kept it, or, if there be merit, does it not rather attach to the original grower? In short, there are so many reasons to prevent the jurors forming a correct judgment, so many causes of inequality, such an absence of fixed data, and notwithstanding the actual magnitude of the exhibition, hiatuses so great in many of the groups, that the whole is inadequately represented and the conclusions partial and entitled to but a very secondary value. Regrets, in fact, that such conclusions should go forth to the public as deliberate and complete judgments, for such, from inevitable causes, he is satisfied they cannot be. At the same time the public, who cannot be aware of the attendant circumstances, attaches weight to their judgments, and may be led to form very erroneous conclusions, in some cases from the absence of medals, in others cases from their presence. Nor does it seem that the investigation has had the advantage of making known new, or little known, growths or sources of supply. Wines of well known growths and use have obtained the greater number of medals, and the others are wines which are known and appreciated in their own districts or countries, but are not likely or worthy from distance, small quantity, or other causes, to obtain a foreign demand. Although the preceding observations are made with reference to the exhibition of wines and spirits, the writer believes they will apply in some measure to most articles of food. Should also be disposed, for the reasons assigned in answer to No. 7, to extend them more generally. Many things are difficult to judge of, especially philosophical instruments, which in most cases require time, use, and careful comparison for their due estimation. 3. If works of Fine Art and Designs are exhibited, they ought not to be excluded from awards. On the contrary, considers, if awards are to be made, that such works, being the immediate production of the exhibitor, and depending solely on his own skill and ability, admit of an easier estimate than goods where other elements, such as seasons, public taste, and collateral aid are concerned. 4. No suggestions to make. 5. Suggests that a clerk be attached to each jury to copy letters and rough notes, enter minutes, &c.; the time of the jurors being fully occupied, their attention is apt to be distracted by these necessary details, which also are in consequence apt to be neglected. 6. Any appeal from the decision of the juries is undesirable. At the same time the writer is satisfied that great oversights are sometimes made. 7. The public is the best judge of any meritorious productions, and wherever such exist, from the active intercourse now established by railway and post-office, and the keen competition among men of business, they can hardly fail to become known. Delays may occur, but the object is attained with far greater certainty than can be hoped for by the opinion of the few, and the irregular and partial, though quicker, operation of jury awards. Not but that there are cases where awards are useful in detecting obscure and hidden merit, but the machinery appears too liable to error, too cumbersome, and too costly for the gain effected, while in many cases it is a mere work of supererogation. For example, in Jamaica there are 178 exhibitors of rum and liqueurs, and the samples embrace almost all the trade marks. But these marks are all perfectly well known, and their value estimated to within 1d. per gallon in the Mincing-lane market. This known market value of the different marks would be a safer criterion than the unavoidably hurried examination of single samples, although the jurors were as competent as they were just

and impartial, for, besides the hurry, it is to be observed that single samples do not give the value of particular parcels of rum; the different puncheons of the same mark will often differ, as will also different shipments of the same mark, the actual value and position of any given mark being established by the experience of successive shipments through a number of years. This, in fact, is the case with wines and most other articles of trade. It is not one shipment or one year that suffices to establish the value and merit of any produce. It is the capability and skill of establishing and maintaining a permanent superiority, and such superiority needs no medal to secure a deserved attention and rightly apportioned and remunerative demand.

WESTLEY RICHARDS (W. Richards and Co.), Exhibitor, XIc.—1. No. 2. The difficulties in the way of making proper awards are so great, owing to the variety of tastes and the conflict of opinions, that it is next to an impossibility to come to a just decision on the merits of the various articles exhibited. Therefore, better to make no awards, but to leave the public to judge. By medals the public are often misled rather than assisted; advertising shopkeepers get up things for exhibition—not fair samples commonly produced, and use the medal for purposes of advertising. The medal is of little or no value to the manufacturer of established reputation. 3. Of the two prefers giving medals to works of art rather than to manufactured goods, but sees no reason for pronouncing an opinion upon them, as they speak for themselves. 4. No. 5. No. 6. Thinks there would be no harm in an appeal if good cause be shown. 7. Cannot, unless there were some large permanent building where manufacturers were allowed to exhibit their goods, and none were permitted to exhibit except those whose ordinary productions were of undoubted excellence, and the firm might be relied upon for supplying goods equal to their patterns. There would be many difficulties in carrying out an arrangement of this kind, but if it could be done it would facilitate the operations of purchasers, particularly of foreigners.

R. RIDDELLS, Juror, Class IVc.—1. Yes. 2. Causes emulation and stimulus to exertion. 4. No. 5. Each class of jurors should have a paid clerk or secretary to attend and register the proceedings; also, each class of jurors should have a special and convenient room set apart for it to meet and deliberate in, and a sufficient time for such deliberation before sending in the reports. No decision to be final unless a majority of the jurors are present; and no person should be allowed to accept the appointment of juror who is unable or unwilling to give up his time to the performance of the duties he is necessarily bound to perform. 6. Only if it can be clearly shown that the exhibitor has been inadvertently passed over.

EUGENE RIMMEL, Juror, Class IVD., and Exhibitor in Classes IVD. and XVII.—1. Yes. 2. They stimulate industry, and many of the most important exhibitors would not go to the trouble and expense of showing their goods, were it not in the hope of obtaining some reward. 3. Works of fine arts and designs might receive medals, but they are not so necessary for artists as for manufacturers. 4. No. 5. The election of jurors by the exhibitors themselves, as it was done in the British Section, is the very best mode of appointment, and it would be highly desirable that foreign Commissions should adopt the course. 6. No appeal, unless the exhibitor can prove satisfactorily that his goods have not been examined. 7. See reply to 1. 8. In the present Exhibition some juries were divided into sections, each section having the power of deciding on awards to be made, but their decisions were submitted for confirmation to a general meeting of the class. It sometimes happened that their awards were overruled by a majority composed of persons who knew little or nothing of the article examined. Suggests as a remedy, that in the event of the awards of one section being disputed by the others, three or four jurors drawn by lot should re-examine the articles in question, and their decision should be final. The same plan should be adopted when an award is proposed by the majority of the class without the sanction of the section to which it belongs. Three distinctive sorts of awards are desirable. A first-class medal for new and really meritorious inventions, a second class medal for excellence of manufacture, and an honourable mention for ordinary merit. The proportion of medals granted in the present Exhibition too large, thereby reducing their value.

(To be continued.)

Proceedings of Institutions.

BACUP MECHANICS' INSTITUTION.—The twenty-fourth anniversary of this Institution was celebrated by a *soirée* on the 2nd of January, when there was a very large attendance. LAWRENCE HEYWORTH, Esq., President of the Institution took the chair, this being the twenty-fourth occasion, without intermission, that he has occupied this honourable position. Mr. Delavanti gave some of his choice musical selections, and was assisted by Miss North, of the Leeds and York concerts. Mr. Andrews presided at the pianoforte. By the kindness of Col. Munn, the band of the 4th Lancashire Rifles also attended. Mr. NEWBIGGING, the secretary, read the report, from which it appears that the Institution receives that support and encouragement from the public which enables it to maintain and even to extend its character for usefulness, although it is to be regretted that the wide-spread depression which prevails, in consequence of the cotton famine, has hindered the progress of those improvements in the various departments which the directors have long and anxiously laboured to accomplish. The treasurer's statement shows that the expenditure for the year exceeds the income by the sum of £29 10s. 5d. This arises partly from a diminution in the receipts of the day-school, owing to the inability of many of the scholars to pay the usual fees; but principally from a great falling off in the amount received for the use of the hall. Several gentlemen, however, with a liberality which is deserving of commendation, voluntarily commenced a subscription for the purpose of liquidating this debt, and several donations have been received. Notwithstanding the great depression which exists, the members' subscriptions are in excess of any previous year; a result which proves the high esteem in which the Institution is held, and the anxiety of the members to give it their countenance and support through these trying times. A course of Wednesday evening lectures and entertainments was inaugurated in October last, and these have hitherto been well attended, and on the whole have given satisfaction. The series will extend to the last Wednesday in March. The following is a list of the lectures, &c., in the order of delivery:—W. P. Roberts, Esq., of Manchester, "Jerusalem and the Holy Land," two lectures, illustrated by views, flowers, plants, &c.; Rev. G. Hoade, of Hindley, "An Evening with some of our English Poets;" Rev. Thos. Lawson, of Bacup, "The Crusades," music by the Tonic Sol-fa Class; Mr. Thos. Newbigging, of Bacup, "The Chemistry of Water," illustrated by experiments; David Morris, Esq., of Manchester, "Lancashire Poets and Poetry," musical illustrations; J. M. Whitehead, Esq., and Company, of Bury, "Two Hours of Music, Mirth, and Magic;" Mr. D. W. Greenhalgh, of Stubbins, "The Air we Breathe," illustrated by experiments; Robt. Crossland, Esq., of Bury, "Lord Brougham, the Orator and Statesman;" Rev. Thomas Lawson, of Bacup, "Books and how to read them." The following remain to be delivered:—Rev. J. Swann Withington, of Rawtenstall, "A Trio of Great Men of our Nation,—Cromwell and Government, Newton and Philosophy, Milton and Poetry;" Mr. H. P. Meaden, of Haslingden,

"Combustion and some of its Phenomena," illustrated by experiments; David Thomas, Esq., of Bury, "America, Past and Present;" B. Lee, Esq., of Manchester, "Readings from the Poets and other Authors;" Rev. W. H. C. Anson, of Clough Fold, "The Brain and Nervous System," illustrated by drawings and casts; Mr. A. Stansfield, of Todmorden, "Electricity," illustrated by experiments; T. T. Wilkinson, Esq., F.R.A.S., &c., of Burnley, "The Popular Customs and Superstitions of Lancashire;" Wm. Mitchell, Esq., of Waterfoot, "Athletic Sports;" Thomas Baldwin, Esq., C.E., of Bury, "The Steam Engine;" Adam Fletcher, Esq., M.D., of Bury, "The Marvels of the Invisible, or an Evening with the Microscope," illustrated by microscopic specimens; Joseph Chattwood, Esq., of Bury, "Readings from an Old Manuscript," illustrated by geological specimens. To the various gentlemen who have so generously placed their time and services at the disposal of the Committee, and also to the musical friends in the neighbourhood who assisted at several of the meetings, the sincere thanks of the directors are most gratefully accorded. The state of the funds has prevented the directors from making any very important additions to the library. Since last report 38 volumes have been added. The issue and re-issue of books during the twelve months is as follows:—1st quarter, 2,115 volumes; 2nd quarter, 1,863 volumes; 3rd quarter, 1,175 volumes; 4th quarter, 1,546; total, 6,699; being an increase of 25 per cent. on last year's circulation. The newsroom was enlarged and otherwise improved at the beginning of the year, and continues to be well attended. The directors beg to acknowledge with thanks the receipt, gratis, of books, newspapers, and magazines from the president and other gentlemen. The average attendance at the evening classes, male and female, during the past year, is lower than the attendance for 1861. This result, the directors have reason to believe, is entirely owing to the inability of many of the pupils to continue their subscriptions. At the examinations which have taken place during the year, in connection with the Society of Arts, and East Lancashire Union of Institutions, the members of the Bacup Mechanics' Institution have achieved a fair share of success; especially when it is recollected that this is their first essay in the one, and only their second in the other. At the local examinations in March last, prizes to the value of £7 were awarded to the successful candidates. The following special prizes, annually given by the gentlemen named, are open for competition in the classes:—Sam. Hall, Esq., for general proficiency, £1 1s.: Henry Maden, Esq., grammar and composition, first prize, £1 1s., second prize, 10s. 6d.; Dr. Worrall, writing, £1; J. H. Sykes, Esq., £1 1s. During the year various improvements have been effected in the day school, which have materially added to the comfort of the scholars. The attendance at present is large, and care is taken to provide such instruction as shall be useful to the pupils in future years—The Chairman said it had afforded him very much pleasure to listen to the encouraging report which had been read, for at a period when many of our labourers did not get less wages but frequently got none at all, it was very creditable to the place that the institution had been kept up in its present position. It was exceedingly important that they should not only excel in the acquisition of knowledge, but that they should endeavour to turn that knowledge to practical effect. In the course of his address the chairman especially pointed out the value of a knowledge of political economy and kindred subjects to the working classes. He then proceeded to distribute certificates which had been obtained from the Society of Arts. He eulogised the young men for the proficiency they had made in their studies. Mr. Tattersall, of Accrington, moved the adoption of the report. Mr. Thos. Bazley, of Manchester, next addressed the audience, and was followed by Mr. Barnett Blake (Agent to the Yorkshire Union), Dr. Watts, and other gentlemen.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. Proposed route to Siam across the Isthmus of Kraw, by Captains Fraser and Forling. Communicated by Dr. Duncan Macpherson, M.D., F.R.G.S. 2. Mr. Lawrence Oliphant, "Visit to the Island of Tsusima."
Entomological, 7. Annual General Meeting.
British Architects, 8.
Actuaries, 7.
Medical, 8½. Mr. W. C. Calthorp, "Spontaneous closure of the axillary artery after division (by a gun-shot wound), with final recovery of the patient."

Tues. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Renewed discussion on Mr. W. H. Preece's Paper, "On Railway Telegraphs, and the application of Electricity to the Signalling and Working of Trains."
Zoological, 9.
Royal Inst., 3. Professor Marshall, F.R.S., "On Animal Mechanics."

Wed. ...Society of Arts, 8. Mr. T. A. Masey, "On the best means of establishing Electrical Communication between Great Britain and America."
Archæological Association, 8½. 1. Mr. Madden, "On Ancient Literary Frauds and Forgeries." 2. Mr. Turner, "On Sepulchral Discoveries at Stapleford Tawney Church, Essex." 3. Mr. Syer Cuming, "On the Discovery of Roman Remains at Combe Wood, Bath, and Exhibition of the Antiquities found by Mr. Geo. Cruickshank."

Thurs...Royal, 8½.
Antiquaries, 8½.
Royal Inst., 3. Dr. E. Frankland, F.R.S., "On Chemical Affinity."
Philosophical Club, 6.
Artists and Amateurs, 8.

Fri. ......Royal Inst., 8. His Eminence Cardinal Wiseman, "On the Points of Contact between Science and Art."
R. United Service Inst., 3. Lieut.-Colonel Alexander Strange, "Telescopes and Opera Glasses for use in the Field or at Sea."

Sat. ......Royal Inst., 3. Mr. W. S. Savory, F.R.S., "On Life and Death."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, January* 16*th*, 1863.]

Dated 1*st September*, 1862.

2422. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of braid, and in machinery or apparatus employed therein. (A com.)

Dated 20*th September*, 1862.

2581. B. Hotchkiss, New Haven, U.S.—Atmospheric trip hammers.

Dated 17*th October*, 1862.

2804. H. Wickens, 4, Tokenhouse-yard, Bank—Imp. in machinery for making nails. (Partly a com.)

Dated 1*st November*, 1862.

2959. W. E. Newton, 66, Chancery-lane—Improved apparatus for drying grain and other substances. (A com.)

Dated 10*th November*, 1862.

3027. J. B. Savoine, St. Pierre, near Calais, France—A kitchen range adapted for cooking, warming the apartments, and generating gas for the use of private families, hotels, or gentlemen's country seats.

Dated 29*th November*, 1862.

3203. T. Evans, Cross-street, Abergavenny, Monmouthshire—Imp. in coverings for the leg and thigh known as antigrophilos.

Dated 8*th December*, 1862.

3291. J. Hilliar, Balsall-heath, Worcester—Imp. in ventilating, and in the exclusion of dust or draught, insects, or other animals from apartments, carriages, or other confined spaces.

Dated 10*th December*, 1862.

3312. A. P. Price, Lincoln's-inn-fields—Imp. in the manufacture or production of blue colours. (A com.)

3313. D. Chalmers, Dundee—Imp. in the preparation or manufacture of textile materials, and in the machinery or apparatus used therein.

Dated 17*th December*, 1862.

3374. T. C. Barraclough, Manchester—Imp. in machinery for spinning, twisting, and rolling tobacco. (A com.)

Dated 22*nd December*, 1862.

3411. F. C. Bakewell, 6, Haverstock-terrace, Hampstead—Imp. in transmitting and receiving communications by means of electricity.

Dated 23*rd December*, 1862.

3421. C. Pieper, 10, Alma-place, West Gorton, near Manchester—A new improved governor for steam engines, turbines, water wheels, and other machinery with valvular arrangements, to regulate the speed of the same.

3428. J. Whitley and J. W. Burton, Leeds—Imp. in the construction of the permanent way of railways, which improvements are also applicable to railway wheels.

Dated 24th December, 1862.

3431. S. Haslam and A. Eatough, Bolton—Imp. in machinery or apparatus for preparing cotton or other fibrous materials to be spun.
3433. J. Broadbent, Manchester, and J. Robinson, Latchford, Warrington, Cheshire—Imp. in machinery for opening and cleaning cotton and other fibrous materials.
3435. A. P. Tronchon, 4, South-street, Finsbury—Some imp. in the construction of fire-arms.
3437. W. C. Galloway, Glasgow—Imp. in pianofortes.
3438. W. Henderson, Glasgow—Imp. in obtaining iron and steel from certain ores and residual products.
3439. W. Clark, 53, Chancery-lane—Imp. in the means of applying heat to the feet in boots, shoes, and otherwise, part of which improvements is applicable to other heating purposes. (A com.)
3441. J. Fairless, Forth Banks, Newcastle-upon-Tyne—Imp. in apparatus or machinery for milking cows.
3443. E. Stevens, 139, Cheapside—Imp. in machinery for preparing dough and paste suitable for making bread, biscuits, pastry, cakes, and similar articles.
3445. J. Lord and W. Lord, Bolton—Imp. in machinery for fluting rollers, used for preparing, spinning, and doubling fibrous materials.
3447. D. G. Hope, Grays, Essex—Improved machinery for obtaining and applying motive power.
3451. R. Knox, Swinton-street, Gray's-inn-road—Imp. in the manufacture of metallic pens.

Dated 26th December, 1862.

3452. W. Clark, 53, Chancery-lane—Imp. in fire arms. (A com.)
3453. C. F. Varley, Fortess-terrace, Middlesex—Imp. in electric telegraphs.

Dated 27th December, 1862.

3457. M. F. A. Courtois, Paris—Imp. in wax or other candles and torches.
3459. J. Petrie, Rochdale—Imp. in slide valves for steam engines.

Dated 29th December, 1862.

3461. J. G. Taylor, Paris—Imp. in dress fastenings, and in the ornamenting thereof.
3463. J. H. Riddell, 155, Cheapside—Imp. in stoves.
3465. F. Tolhausen, 17, Faubourg Montmartre, Paris—The use of petroleum or coal oil as fuel, and also for the machinery and apparatus to be employed for this purpose. (A com.)
3467. C. E. Wilson, Monkwell-street—Imp. in articles of wearing apparel for the neck.

Dated 30th December, 1862.

3470. J. Johnston, Pinstone-street, Sheffield—An improved surface refrigerator.
3471. J. Robson, jun., South Shields—Imp. in ornamental fittings for domestic stove grates.
3473. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in the manufacture of saddles. (A com.)
3474. F. B. Anderson, Birmingham—Imp. in watches and other time keepers.
3475. W. Bowser and H. Bowser, Glasgow—Imp. in coating or protecting iron or steel with another metal.
3477. J. E. Carter, 3, Brownlow-mews, Gray's-inn-lane—Imp. in chimney tops.
3480. C. Beslay, 11, Rue Menilmontant, Paris—Imp. in steam engines.

Dated 31st December, 1862.

3482. W. B. Adams, Holly Mount, Hampstead—Imp. in railways and tramways.
3484. J. S. Smith and J. Hardmann, Britannia, near Bacup, Lancashire—Certain imp. in power looms for weaving.
3486. W. Clark, 53, Chancery lane—Imp. in the arrangement of the parts of railway trains, and in the application of power for their propulsion. (A com.)

Dated 1st January, 1863.

4. M. E. Bowra, Upper Norwood, Surrey, and A. E. Francis, 10, Tokenhouse-yard—Imp. in the manufacture of elastic fabrics.

Dated 2nd January, 1863.

12. W. A. Distin, Tavistock-row, Covent-garden—Imp. in pipes for smoking tobacco or other herbaceous compounds.
14. C. Eyland, Walsall, Staffordshire—An imp. or imps. in the manufacture of buckles.
16. A. Bamford, Belle Flat-street, Richard-street, R. Blomley, Taylor-street, Whitworth-road, R. Taylor, 67, Manchester-road, and J. Lett, 9, Water-street, Rochdale—Imp. in looms for weaving.
18. W. H. Muntz, Milbrook, Hants—An improved method of attaching sheathing to iron or other vessels.
20. J. E. Dowson, 38, Dowgate-hill, Thames-street—Imp. in the manufacture of wrought metal piles, columns, and shafts.
22. A. S. Bolton, Birmingham—Imp. in the manufacture of wire.

Dated 3rd January, 1863.

24. E. Skull and E. Mealing, High Wycombe, Bucks—Imp. in chairs and other seats or apparatus for sitting or reclining on, which imp. are also applicable to tables.
26. S. White, Suffolk-grove, Southwark—Imp. in the method of and apparatus for purifying, bleaching, and refining oils and oily and fatty matters.
30. W. E. Newton, 66, Chancery-lane—An improved method of firing or discharging cannon and other fire arms, a part of which invention is applicable generally to the firing of charges of powder. (A com.)

Dated 5th January, 1863.

32. H. Yates, Birmingham—Imp. in machinery used in the manufacture of shovels and spades, and for raising and shaping metals for other purposes.
34. J. Howard and J. Bullough, Accrington, Lancashire—Imp. in warping or beaming machines.
36. A. Monnet, 5, Rue de la Platiere, Lyon, France—Imp. n twisting and throwing silk and other fibres.
38. H. Chamberlain, Langley Fawley, Hants—Imp. in generating and condensing steam and evaporating liquids, and in apparatus employed therein.

Dated 6th January, 1863.

42. C. T. Judkins, 22, Ludgate-street—New alloys. (A com.)
48. E. V. Gardner, Berners street—Imp. in the treatment of petroleum and mineral oils, and in apparatus employed therein.
52. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in rocket torpedos, and in the apparatus for directing the flight of the same under water. (A com.)

Dated 7th January, 1863.

58. W. Clark, 53, Chancery-lane—Improved media for advertising. (A com.)
60. G. A. Huddart, Brynkir, Carnarvon—Imp. in buttons.
62. G. Dowler, Birmingham—Imp. in the manufacture of match boxes.

Dated 8th January, 1863.

68. A. Guild, Dundee—Improved machinery for breaking and cleaning flax, hemp, and other fibre-yielding plants. (A com.)

Invention with Complete Specification Filed.

67. L. Hull, Massachusetts, U.S.—Having reference to the treatment of ground caoutchouc, and for the purpose of rendering it elastic or improving its elasticity, as well as imparting to such caoutchouc other useful properties.—8th January, 1863

Patents Sealed.

[*From Gazette, January 16th, 1863.*]

January 16th.

2049. T. B. Daft.
2051. J. Willcock.
2057. C. A. Day and T. Summers.
2060. R. Barrett.
2061. R. A. Brooman.
2070. E. Bazin.
2071. W. E. Gedge.
2072. T. Davey.
2119. A. Lahousse.
2158. W. E. Gedge.
2163. J. Benyon.
2165. W. Clark.
2373. J. A. Coffey and T. Redwood.
2872. J. Carpendale.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, January 20th, 1863.*]

January 13th.

100. M. A. F. Mennons.
116. S. Fearnley.
129. A. Chaplin.

January 14th.

127. G. J. Barker & T. Barker.

January 15th.

147. G. H. Cottam & H. R. Cottam.

January 16th.

120. J. F. Spencer.

January 17th.

130. W. W. Hewitson and B. Walker.
149. F. J. J. de la Ferte.
299. G. A. Biddell.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, January 20th, 1863.*]

January 13th.

162. P. L. Tieffe-Lacroix.

January 15th.

120. J. Fowler, jun.
122. H. R. Worthington.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No.	Date of Registration.	Title.	Name.	Address.
4533	Jan. 2	An Envelope	Charles Elias Penny	16, Cannon-street-west, London, E.C.
4534	,, 21	Treble-elliptic Carriage Spring	David Davies	St. Julian's Friars, Shrewsbury, Salop.

Journal of the Society of Arts.

FRIDAY, JANUARY 30, 1863.

SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The Council hereby convene a General Meeting of the Members of this Society, to be held on Saturday, the 7th February, at 2 o'clock, p.m., to receive a Report from the Council in reference to the intended Memorial of the Prince Consort for the Society.

By Order of the Council,

P. LE NEVE FOSTER, Secretary.

28th January, 1863.

NOTICE TO MEMBERS.

The following circular has been sent to each member of the Society:—

Society of Arts, Manufactures, and Commerce,
John-street, Adelphi, London, W.C., 30th January, 1863.

Sir,—In preparing the lists of members from which Committees of Reference are to be appointed by the Council, in conformity with the 36th bye-law, the Council desire to avail themselves, in the fullest and most useful manner, of the varied information and practical experience of all the members of the Society who may be willing to promote its objects by serving on such Committees.

To this end the Council propose to frame the lists under the nine general heads undermentioned; and they will be much obliged to you if you will inform me, on or before Monday, the 9th of February next, on which list, if any, you are willing that your name should be placed, and if you will specify any subject or subjects, in which you take a particular interest, capable of being properly included under the general head selected by you.

In the event of your not wishing your name to be placed on any of the lists, no reply is expected to this letter.

I am, Sir, your obedient servant,
P. LE NEVE FOSTER, Secretary.

I. Fine Art.
II. Agriculture.
III. Chemistry.
IV. Manufactures.
V. Mechanics and Engineering.
VI. Commerce.
VII. Colonies.
VIII. Education.
IX. Economic and Sanitary Science.

EIGHTH ORDINARY MEETING.

Wednesday, January 28, 1863.

The Eighth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 28th inst., W. R. Grove, Esq., Q.C., F.R.S., in the chair.

The following candidates were proposed for election as members of the Society:—

Adley, Charles Coles	49, Hereford-road North, N.
Beaumont, Joseph	22, Parliament-street, S.W.
Mackenzie, John Henry	3, Dr. Johnson's-buildings, Temple, E.C.
Williams, John Wrigley	3, Bishopsgate-street Within, E.C.

The following Candidates were balloted for and duly elected members of the Society:—

Blanchard, Mark Henry	74, Blackfriars-road, S.
Burrell, Alexander	Gresham Club, E.C.
Challis, J. H.	35, St. James's-place, S.W.
Combe, James	(Jas. Combe and Co.), Belfast.
Duncan, Lieut. Francis, LL.D., &c.	Woolwich, S.E.
Fordham, Thomas	18, St. Mary's-ter., Westmoreland-place, Paddington, W.
Hoe, Richard March	New York.
Livingstone, A. S.	Adelaide-cottage, Carlton-road, Peckham, S.E.
Loveridge, Henry	Wolverhampton.
Lückes, Henry Richards	Ross, Herefordshire.
Myddleton, David	Burton, near Lincoln.
Nicole, Adolphe	14, Soho-square, W.
Pairpoint, Thomas Francis	7, Green-street, Leicester-square, W.C.
Ravaison, Walter	8, Richmond-buildings, Dean-street, Soho, W.
Robinson, John	Atlas Works, Manchester.
Sawyer, The Rev. Walter John	Belle Vue House, near Ross, Herefordshire.
Stenson, Joseph	Northampton.
Wadsworth, James	21, St. Symon's-street, Salford, Manchester.

And as Honorary Corresponding Member,

Macchi, Mauro, M.P. ... Turin.

The Paper read was—

THE SUBMARINE TELEGRAPH.

By T. A. Masey.

The remarks which I have to offer this evening are more of an historical character than a scientific treatise upon the subject, and are not intended to illustrate any new principle of electric science, or to advocate any particular cable or route, but simply to place before you what has already been accomplished, and to review the various projects put forth by the different persons interested, leaving it to them, and to the *savans* in the science, many of whom I see present, to tell you in a strictly scientific form their views on the subject.

The invention of the electric telegraph as it now exists belongs not to one individual, but is the joint production of many eminent scientific men at different periods, and of various countries. The following may specially be mentioned:—Watson, in England, 1747; Lesarge, at Geneva, 1774; Betancourt, in Spain, 1787; Sommering, in Germany, 1809; Dyer, in New York, 1820; Steinheil, in Bavaria, 1836; Sir Wm. O'Shaughnessy, in India, 1839; Cooke and Wheatstone, in England, 1837; Professor Jacobi, in Russia, 1842; Morse, in America, 1843, and Brett, in London, 1845.

But to England and Englishmen will ever belong the merit of its first practical use and development, and the names of Cooke, Wheatstone, and Brett, will ever stand out as landmarks in the history and progress of this wonderful invention as the men who gave the lightning voice, and bade it speak in every tongue its marvellous messages to the world. With the names of the two first gentlemen must ever be associated the merit of having practically introduced the science of land telegraphy, and with the name of the latter that of submarine.

Now that the submarine telegraph occupies such a prominent position before the world, many have claimed the honour of its invention, because they had been associated with it at an early date. Without wishing to detract from the merit of the labours of one individual, or to add to those of another, I may be permitted to state so far as it is known what each rival claimant did.

Professor Wheatstone, in 1840, prepared plans for a

submarine telegraph, which he either did not complete, or circumstances prevented him from making any practical use of them, at that time or since.

Professor Morse states that in 1842 he laid an insulated wire across from Castle Garden to Governor's Island in the harbour of New York, and demonstrated the practicability of submarine telegraphy. His experiments, however, went no further, beyond suggesting the probability that a telegraph across the Atlantic would be some day accomplished.

The theory and experiment were destined to be practically and successfully carried out by another. Mr. Brett, in 1845, took out a patent (the first on record) for the invention of a submarine electric cable, the insulating medium to be caoutchouc and other substances (gutta percha not having come into use for telegraph purposes) protected by a plaited hempen cord, similar to that which is being advocated by several persons at the present time.

It also appears on reference to the Government Joint Stock Registration Office, that in June, 1845, the Messrs. Brett registered a company "To form a connecting mode of communication, by telegraphic means, from the British Islands, and across the Atlantic Ocean to Nova Scotia and the Canadas, the colonies, and continental kingdoms."

At that early period the public had scarcely realised the mighty progress of steam and railway engineering science, and only looked upon the electric telegraph as a necessary appendage to the railway, and but dimly comprehended its method of action, or the vital necessity which it has since become to the capitalist, merchant, and *agent de change*.

Mr. Brett, however, worked on, but receiving no support or encouragement from the British Government, to whom he had applied for assistance, he turned his attention to France, and, in 1847, received from the government of Louis Philippe an exclusive grant to lay cables on the French coast for ten years, which was afterwards renewed by the Emperor of the French, and in August, 1850, together with other gentlemen associated with him, he laid the first experimental line across the Channel from Dover to Calais.

This cable was simply a gutta percha covered copper wire, and considering the manner it was laid, it is a wonder that it was at all successful. It was simply wound round a large drum, like a reel of cotton, placed upon the deck, and as it ran out large heavy lead weights were attached at various lengths to sink it, which contained in themselves the elements of destruction. But the fates were propitious, and everything went well, the cable was laid, landed, and spoke—words that must have thrilled through the hearts of the anxious projectors, proving that the idea was no mere idle vision of the brain, as some eminent engineers had stated it to be, but a reality. Greatly to the regret and disappointment of all interested, the cable broke during the night. However, success had been such that the promoters set to work, and a more durable cable, from the specification of Mr. J. W. Brett, was begun by Messrs. Wilkins and Wheatherly, and finished by Messrs. Newall and Co., but the length proving insufficient when laid, it was buoyed, and the additional length manufactured by Messrs. Kuper and Co., now the firm of Messrs. Glass, Elliott, and Co., so that three different manufacturers assisted in making the first permanent cable.

It was laid in August, 1851, and although it has several times been broken by ships' anchors, yet at the present time it works as well, and is in as good preservation, as on the day it was laid, and is an example of the durability of submarine lines, even with rough handling, when the materials are good, well constructed, and properly laid.

The success of this undertaking having proved everything that the promoters anticipated, other enterprises immediately followed. The Table on the next page gives full particulars of the various submarine cables.

It appears that 15,156½ miles of telegraphic cables have been laid. Some have proved most successful, while others have become total failures, and at the present moment there are only about 6,350½ miles at work. It will be seen that the average of lost cables is about one-third, if the Atlantic and Red Sea cables, which together make 5,761 miles, be taken away, on the principle that from the first they were totally unfitted for the work, and ought not to have been laid; the former from causes which I will hereafter explain, and the second, from the fact that if the most ordinary precautions, and the experience obtained by the Atlantic cable had been observed, the line might now have been in operation.

It is also worthy of note that out of the 6,350½ miles in perfect working order, upwards of 4,000 were manufactured by Messrs. Glass, Elliott, and Co.

It would occupy too much of your time this evening to discuss separately the causes which have occasioned the ruin of so many cables. I will, therefore, confine myself to the principal subject of the evening, the

Atlantic Telegraph.

It appears that from the year 1845, Mr. Brett continually solicited aid from the British Government towards an Atlantic line, but without success until 1856, when the government of Lord Palmerston granted a subsidy of £14,000, and the American Government gave a similar guarantee; each grant being still in force so long as a cable be laid down and continue in working order between Ireland and Newfoundland.

Previous to this date in 1851, Mr. F. N. Gisborne, an engineer, proposed the plan, which is now adopted, to shorten the communication between Europe and America, by making St. John's, Newfoundland, a port of call for Atlantic steamers, and constructing a telegraph from thence to join the American lines. His company, however, failed to carry out the undertaking, and was bought up by Mr. Brett, Mr. Cyrus W. Field, and other American gentlemen, who completed the communication to the American continent, and having obtained certain privileges from the legislature of that colony, and also the exclusive right to land cables, immediately turned their attention to the realization of a telegraph line across the Atlantic.

About this time, 1854, Prof. Faraday and Mr. Latimer Clark, made some experiments relative to an electrical phenomenon which had presented itself to the observation of persons working underground lines and submarine cables, viz., the difference in speed at which the fluid travelled along a wire covered with an insulating substance and laid in the sea or earth, and along a simple wire suspended by insulators attached to poles. This had been observed by Mr. Varley in 1848, and by Mr. Siemens in 1849.

It was observed in the case of the former that a resistance was offered to the flight of the fluid from induction. That is, when a wire is covered with an insulating substance, say gutta-percha or india-rubber, and surrounded by water, or laid in the earth, and a current of electricity is sent along the wire, the travelling electricity excites in its progress an electrical force of an opposite kind, which attracts and retards the current moving freely on its journey as it would do along an aërial line. It will be readily understood that the longer the cable the greater the resistance of the induction, and so greatly was this effect feared at that time, that it was said a cable of 2,500 miles could not be worked commercially.

The subject therefore had to be examined, and experiments made, to determine the law which governed the loss of speed, and the current's power to produce mechanical effects at the end of a lengthened journey.

Mr. Whitehouse, the late electrician of the Atlantic Company, at the request, and under an agreement with Mr. Brett, turned his attention to the subject, and made some valuable experiments upon a cable then being manufactured for the latter gentleman at Greenwich. The British and Irish Magnetic Company, who possessed long lengths of underground lines, placed them at this gentle-

SUBMARINE CABLES.

Date when laid.	From	To	No. of Conductors.	Size per Birmingham Wire Gauge.	Size of Gutta Percha per Birmingham Wire Gauge.	Outside Wires. No.	Outside Wires. Size.	Length of Cable in Statute Miles.	Length of Insulated Wire in Statute Miles.	Depth of Water in Fathoms.	By whom manufactured.	Length of time the Cables have been working.
1851	Dover	Calais	4	16	2	10	1	27	108	...	Wilkins & Wetherley, Newall and Co., Kuper and Co., and Mr. Crampton.	11 years.
1852	Holyhead... ...	Houth	1	...	...	12	...	73	73	...	R. S. Newall.	... ...
1853	Denmark, across the Belt...	... ...	3	18	4	9	2	18	54	...	R. S. Newall and Co.	9 years.
1853	Dover	Ostend	6	16	2	12	2	80½	483	...	Newall & Co., & Kuper & Co.	9 years.
1853	Frith of Forth ...	... .	4	16	1	10	8	5	20	...	R. S. Newall and Co.	9 years.
						4 cables	galvanized					
1853	Portpatrick ..	Donaghadee ...	6	16	2	12	2	25	150	...	Ditto.	9 years.
1853	England*... ...	Holland* ...	1	16	1	10	8	480	480	30	Ditto.	9 years.
							galvanized					
1854	Portpatrick ...	Whitehead ...	...	6	...	..	...	27	162	...	Ditto.	... ...
1854	Sweden	Denmark ...	3	16	No. 2	10	2	12	36	14	Glass, Elliot, and Co.	8 years.
1854	Holyhead... ..	Houth	...	...	...	...	...	73	73	...	R. S. Newall and Co.	8 years.
1854	Italy	Corsica	6	16	1	12	1	110	660	325	Glass, Elliot, and Co.	8 years.
1854	Corsica	Sardinia	6	16	1	12	1	10	60	20	Ditto.	8 years.
1855	Varna	Constantinople...	...	...	...	...	...	172	172	...	Newall.	7 years.
1855	Varna	Balaklava ...	...	...	...	...	...	356	356	...	Ditto.	7 years.
1855	Egypt	... ...	4	16	2	10	1	10	40	...	Glass, Elliot, and Co.	7 years.
1855	Italy	Sicily	3	16	2	10	1	5	5	27	Ditto.	7 years.
1856	Newfoundland ...	Cape Breton ...	1 strand.	14	1	12	9	85	85	360	Ditto.	6 years.
1856	Prince Edward's Island ...	New Brunswick.	1 do.	14	1	12	9	12	12	14	Ditto.	6 years.
1857	Norway ... across	Fiords	1 do.	14	1	10	6	49	49	300	Ditto.	5 years.
1857 1857	Sardinia ... .. Malta	Malta ... Corfu ...	...	...	...	...	...	700	700	...	Newall and Co.	... ...
1857	Across mouths of	Danube	1 do.	14	1	12	9	3	3	...	Glass, Elliot, and Co.	5 years.
1857	Ceylon	Mainland of India, &c.	1 do.	14	⅜	...	8	30	30	...	Ditto.	5 years.
1857	Sardinia	Bona	4	...	...	...	...	125	500	...	Newall and Co.	3 years.
1858	Italy	Sicily	1	16	2	10	1	8	8	60	Glass, Elliot, and Co.	4 years.
1858	Dardanelles ...	Scio and Candia.	...	...	...	...	...	514	514	...	... ...	4 years.
1858	England	Holland	4	13	0	10	00	140	560	30	Glass, Elliot, and Co.	4 years.
1858	Ditto	Hanover... ...	2 strands.	16	3	12	6½	280	560	30	Ditto.	4 years.
1858	Norway .. across	Fiords	1 do.	14	1	10	6	16	16	300	Ditto.	4 years.
1858	South Australia...	King's Island ...	1	16	1	10	8	140	140	45	W. T. Henley.	4 years.
1858	Weymouth ...	Alderney ...	...	...	...	...	...	93	93	...	... . .	4 years.
1858	Ceylon	India	1	14	⅜	12	8	30	30	45	W. T. Henley.	4 years.
1858	Ireland	Newfoundland ...	...	...	...	...	...	2,222	2,222	...	Glass and Elliot, & Newall & Co.	... ...
1859	Singapore... ...	Batavia	...	...	...	...	...	550	550	...	Newall and Co.	3 years.
1859	Athens	Syra	...	...	...	...	...	117	117	...	... ...	3 years.
1859	Alexandria ...	... ...	4	16	3	10	1	2	8	...	Glass, Elliot, and Co.	3 years.
1859	England	Denmark ...	3 strands.	16	3	12	5½	368	1,104	30	Ditto.	3 years.
1859	Sweden	Gotland	1 do.	14	1	12	9	64	64	80	Ditto.	3 years.
1859	Folkestone ...	Boulogne ...	6 do.	14	3	12	0	24	144	32	Ditto.	3 years.
1859	Across rivers ...	in India	1	13	0	9	2	10	10	...	Ditto.	3 years.
1859	Malta	Sicily	1 strand.	14	1	10	5½	60	60	79	Ditto.	3 years.
1859	England	Isle of Man ...	1	16	2	10	6½	36	36	30	Ditto.	3 years.
1859	Jersey	Pirou in France.	1 strand.	14	⅜	12	5½	21	21	15	Ditto.	2½ years.
1859	Tasmania ...	Bass Straits ...	1	16	1	10	8	240	240	...	W. T. Henley.	2½ years.
1859	Liverpool... ...	Holyhead ...	2	16	3	12	6	25	50	...	Glass and Elliot.	2½ years.
1859 1860	Suez	Kurrachee ...	1	...	...	...	...	3,499	3,499	...	R. S. Newall and Co.	... ...
1860	France	Algiers	1 strand.	14	0	10	14 †	520	520	1,585	Glass, Elliot, and Co.	2 years.
1860	Corfu	Otranto	1 do.	14	0	10	5½	90	90	1,000	Ditto.	2 years.
1860	Denmark... ...	Great Belt { 14 miles 14 miles	6 3	16	1 1	12 10	1	28	126	18	W. T. Henley.	2 years.
1860	Dacca	Pegu	1	13	0	18	14	116	116	...	Ditto.	2 years.
1860	Barcelona ...	Mahon	1	14	1	16	12½	180	180	1,400	Ditto.	2 years.
1860	Minorca	Majorca	2	16	3	18	12	35	70	250	Ditto.	2 years.
1860	Iviza	Majorca	2 strands.	16	3	18	11½	74	148	500	Ditto.	2 years.
1860	St. Antonio ...	Iviza	2 do.	16	3	18	11½	76	152	450	Ditto.	2 years.
1861	Norway ... across	Fiords	1 strand.	14	1	10	6	16	16	300	Glass, Elliot, and Co.	1¾ year.
1861	Toulon	Corsica	1 do.	14	0	10	14 †	195	195	1,550	Ditto.	1¾ year.
1861	Malta	Alexandria ...	1 do.	8	½	18	11	1,535	1,535	420	Ditto.	1 year.
1861	Newhaven ...	Dieppe	6	...	...	...	...	62	372	...	... ...	1 year.
1862	Abermawr, Pembroke	Grenore, Wexford	4 do.	14	1	12	3	63	252	58	Glass, Elliot, and Co.	6 months.
1862	England	Holland	4 do.	13	0	10	00	130	520	30	Ditto.	2 months.
1863	Cape Carbalnara	Trapani	1	...	12	10	...	200	200	200	Ditto.	
1863	Persian Gulf ...	... ...	...	...	...	...	...	20	20	...	Hall and Wells.	... ...
	In Germany, Russia, &c.		...	...	...	...	...	1,000	1,000	...	Felden & Guilleaume.	... ...
							Total	15,176½	19549			

* Fourteen separate cables of 120 miles each

† Steel covered with hemp.

man's disposal, and experiments, at which I believe Sir Charles Bright assisted, were made, extending over some 2,000 miles of insulated underground lines.

The results then arrived at were sufficient to demonstrate, beyond a doubt, and have since been indisputably confirmed, that an Atlantic cable could be worked successfully and commercially, although not at the same high rate of speed as that effected on aërial lines.

These four gentlemen then associated together to carry out the undertaking. Mr. Brett as the originator; Mr. Cyrus W. Field, on the part of the American interests; and Messrs. Bright and Whitehouse, as possessing the scientific element.

The Atlantic Company was then formed, and the necessary capital raised in £1,000 shares. But so eager and anxious were all parties interested to carry out this great work, that not sufficient time or attention was given for proper experiments to be made as to the adaptability of the cable to its future resting place, and the work which it had to perform when there.

True it is that a few experiments were made at the works of Messrs. Brown, Lenox, and Co., upon several cables manufactured by Messrs. Glass, Elliott, and Co., as to their breaking strain, and two were selected from the number tried. One was ultimately adopted weighing 93 lbs. to the mile, with a breaking strain of 3 tons. The other, although possessing greater advantages in strength, being made of single steel wires wound spirally for the outside covering, was not accepted, because of the difficulty and delay there would have been in procuring that description of steel wire. Had this latter cable been adopted, it might have shared the fate of the other, for the breaking strain of the other was sufficient to ensure its being laid safely; but that was not where the defects arose, and had the very best form of cable been subjected to the unfair treatment of the Atlantic, it must have shared a like untimely fate.

The rapidity with which the cable was manufactured would be a marvel of human industry, were it not for the fact that that most careful and watchful supervision required in making the joints and other detailed operations could not be carried out so perfectly as it might otherwise have been, a misfortune which dimmed the lustre of the achievement.

The core was covered with three coatings of gutta-percha representing 7,500 miles of work. 335,000 miles of iron and copper wire were drawn out and spun into more than 47,500 miles of strand, and upwards of 300,000 miles of tarred hemp were saturated and spun round the core, and the whole was put together and woven into a cable in about the space of four months.

As the cable was made it was coiled into several tanks, and by an oversight, quite inexcusable, it was left exposed to the weather at Greenwich, and so seriously had the sun effected it at one time, that sixteen miles had to be cut out. The heat having softened the gutta-percha, the inside copper wire was found protruding and touching the outside iron, thereby destroying the insulation. Now, it is reasonable to suppose that if 16 miles was seriously damaged, a greater length was also injured in a less degree by the same cause, from the copper conducting wire being forced from the centre of the gutta-percha to within a small space of the outside, an imperfection which was not then discovered, but which may afterwards have contributed to accelerate the destruction of the cable.

The first attempt to lay the cable, in 1857, was unsuccessful, owing to breaking in the paying out machinery, which was found unfitted for the operation. It was then unshipped and coiled into tanks made for the purpose at Plymouth, to wait for another year. During the interval it was completely overhauled, and a great many defective places and joints cut out, and upwards of one hundred fresh splices made. Although this was bad enough, yet I believe another operation was performed upon it, that no doubt told a tale when the cable was submerged, which was pricking it every two or three miles for faults, that is, pushing a needle at short lengths through the gutta-percha to the copper wire to test it. Now, if this was done frequently, and the small aperture not carefully stopped up, which may not have been the case in every instance, the great pressure of the water would soon find out these small defects. Another great disadvantage connected with this cable was that owing to its being manufactured by two rival firms 200 miles apart, it was neither tested in one length during its manufacture, nor under water previous to being laid.

The next year the cable was a fourth time recoiled on board the *Niagara* and *Agamemnon*, together with an additional length, making up the total to 3,000 miles. The ships met in mid ocean, and the cable being spliced, one started for the American coast, and the other for the English, and, after three ineffectual attempts in that year, it was at last finally laid 5th August, 1858—laid, as everyone practically connected with the enterprise then knew—only as an experiment, for the injuries it had received were now patent to all, but the cable was made, and must be laid.

A very singular incident happened during the final laying. A series of preconcerted signals through the cable was kept up between the ships during the paying out, but a sudden cessation of these signals was on one occasion perceived, although the insulation was good, and after a time the currents came again as strong as before. This could only be accounted for on the supposition that the internal copper wire had broken from the strain, and that when the cable in which it was had reached the bottom, the two ends had been brought together again by the elasticity of the sheath. A serious fault of insulation also appeared in the cable at about 420 miles from the Irish coast.

From the 5th to the 10th August no messages were sent through the cable, owing to the necessary arrangements not being completed; from the 10th to the 17th no message beyond a few words could be either sent or received, owing to the weakness of the currents from leakage. On the 18th the signals got a little better, and constant communication was kept up, with more or less success, till the 2nd September, when it finally ceased to speak, after having transmitted

Messages.		Words.		Letters.	
97	containing	1,102	containing	6,476	from Valentia to Newfoundland
269	,,	2,840	,,	13,743	from Newfoundland to Valentia.
366	,,	3,942	,,	20,219	Total.

The receiving instruments prepared to work the cable were upon the principle of that of Professor Morse, which is now universally adopted wherever there is a telegraph. Its construction is most simple. The electricity transmitted acts upon an electro-magnet, which is drawn down, whilst a long armature connected to it rises against a piece of travelling paper, making it touch an ink roller above, every time a current of electricity arrives, so that a series of long or short dashes is recorded, according as the current of electricity is kept on for a short or long period. The combination of dots and long strokes thus forms the alphabet.

Code of Signals for the Morse Instrument.

A	— ———	Æ	— ——— — ———
B	——— — —		
C	——— — ——— —	Ch	——— ——— ——— ———
D	——— — — —		
E	—	é	— — ——— — —
F	— — ——— —		
G	——— ——— —	Œ	——— ——— ——— —
H	— — — —		
I	— —	UE	— — ——— ———
J	— ——— ——— ———		
K	——— — ———		
L	— ——— — —		
M	——— ———		
N	——— —		

O	— — —	1	– — — — —
P	– — — –	2	– – — — —
Q	— — – —	3	– – – — —
R	– — –	4	– – – – —
S	– – –	5	– – – – –
T	—	6	— – – – –
U	– – —	7	— — – – –
V	– – – —	8	— — — – –
W	– — —	9	— — — — –
X	— – – —	10	— — — — —
Y	— – — —		
Z	— — – –		

Now, in the case of the Atlantic cable, the amount of electricity which arrived was much too weak to move this armature, and had it not been for Professor Thomson's marine galvanometer, in all probability no message whatever would have been deciphered. This instrument is as ingenious as it is simple, and I will first explain the construction of it, and then the manner of reading off the messages from it.

Round a small brass tube is wound a quantity of the finest copper wire, and suspended in this tube by a silken thread is a little mirror, about the size of a sixpence, with a magnet at the back; upon this mirror a light is thrown from a lamp, which is reflected back by the mirror upon a scale, showing a little spot of light. The apparatus is so simple and sensitive that the slightest current of electricity is sufficient to act upon the magnet attached to the mirror, and cause it to move either to the right or left, according to the nature of the fluid, whether negative or positive. Of course it is necessary to use this instrument in a dark room. In the case of the Atlantic cable, when this instrument was used, a Morse instrument was fitted up on short circuit, that is, only working in the room, totally unconnected with the cable, and whenever the clerk saw the spot of light move on the scale, he immediately pressed down the Morse key, and so made a mark; but when the light vanished he took his hand off until it appeared again, so that he obtained by this means a series of dashes and blanks, according to the Morse alphabet, and that was the ingenious way that the messages were received and decyphered through the Atlantic cable.

On the 1st December, 1859, a Government Committee was appointed by the Board of Trade, at a cost of some £20,000, to inquire into the cause of failure. This Committee, consisting of Captain Galton, Prof. Wheatstone, Mr. W. Fairbairn, Mr. G. P. Bidder, and, on the part of the Atlantic Company, Messrs. E. Clark, Varley, Latimer Clark, and Saward, thoroughly sifted the whole subject, every person who could give any information being examined and the result of their labours is to be found in a Blue Book of more than ordinary dimensions. They state that "the failure of the enterprise was to be attributed to the original design of the cable having been faulty, owing to the absence of experimental data; to the manufacture having been conducted without proper supervision, and to the cable not having been handled after manufacture with sufficient care. We desire, however, to observe that we are clearly of opinion that the failures of the existing submarine lines have been due to causes which might have been guarded against had adequate preliminary investigation been made into the question, and we are convinced that if regard be had to the principles we have enunciated, in devising, manufacturing, laying, and maintaining submarine cables, this class of enterprise may prove as successful as it has hitherto been disastrous."

Attempts to recover any lengths of the Atlantic cable failed owing to the lapse of time before they were made. However, one or two interesting facts came to light; one, that off Newfoundland the cable had been lying upon rocks, and had been chafed very much. Another, and a very important discovery was also made, namely, that wherever the outside covering had been protected by a serving of yarn, the wires were perfectly preserved and quite bright, whilst on a continuation of the same piece a few inches further and uncovered, the wire had corroded down to the thickness of a needle. It was also observed that the cable had been lying on a bed of copper ore, as a coating of that metal had attached itself to the cable.

With regard to the first of these discoveries, a fresh survey of the coast has been made by the United States Government, under the direction of Capt. Orlebor, and a more suitable locality has been decided upon for the next cable, that pointed out by Captain Kell, in 1859, in Trinity Bay, New Pelican Harbour, the bottom of which consists solely of soft mud.

As to the second, it is now acknowledged by all connected with the science, that the outside wires should be protected from corrosion by hemp, and other substances. Messrs. Glass, Elliott, and Co., propose a covering like the specimen on the table.

Since the Atlantic cable was made, the Gutta Percha Co., have greatly improved the manufacture of this important article, and Mr. Varley gives it as his opinion that the insulation of the wires as now manufactured is ten times better than that made in 1857.

Great care is also now bestowed on testing and selecting the copper wire, as it is found that the quality of the copper exercises an important influence on the conducting power of the wire, in some instances a difference of from 30 to 50 per cent.

Another great improvement has been adopted by testing the gutta percha covered wire under pressure according to the depth of water where it will have to be submerged. For instance, if a cable is to descend one mile into the sea, the pressure will be about 2,500 lbs. to the square inch. If two miles, 5,000 lbs., and so on, up to 10,000 lbs. to the square inch. The importance of this fact cannot be too strongly enforced, as any defect arising from air bubbles, or the smallest aperture like a pin's point, would be immediately detected.

The invention is that of Mr. Reid, consisting of a large cast iron cylinder, with a moveable cover to allow the coils of wire to be placed therein. The cover is bolted down and made perfectly air tight. The cylinder is exhausted of air, a vacuum being formed by means of an air pump; the stop cock to the air pump is then shut, and water is pumped in up to the force required—20,000 lbs. to the square inch, if necessary. One end of the wire is conducted from the interior through a stuffing box to the outside, and attached to the testing instrument; the other end of the wire is insulated, the object being to keep the wire charged full of electricity, so that it may try to force itself out while the pressure is applied, and if the wire is not perfectly insulated and the slightest particle of electricity escapes, it is immediately detected.

The practical working of submarine cables has also undergone a change; instead of a large quantity of electricity being transmitted at one time to overcome the resistance of the wire, the wave now communicated is as small and as weak as possible, so as not to wear out the cable unnecessarily. The practice of the science has also demonstrated that positive currents of electricity, or those generated from the copper pole of the battery, are better adapted to the working of submarine cables than the use of the negative currents, or those from the zinc pole of the battery, or both alternately, which, it has been observed, will soon find out the weak and defective places, and destroy the cables at those particular parts. It was this that, in a measure, accelerated the fatal pause in the Atlantic cable, as every current sent along it literally only made matters worse by increasing the injuries which the cable had received previous to its submersion.

A great improvement has also been made in the construction of very delicate instruments for use on long submarine lines, and I am informed by Mr. Varley, that he confidently anticipates working through the next Atlantic cable at the rate of 12 to 16 words per minute.

I will now draw your attention to the five proposed telegraphic routes to America. That from Ireland to

Newfoundland (a distance of about 1,950 miles) having been found practicable, I will take it first.

In 1857, soundings were made by H.M.S. *Cyclops* under Lieut. Commander Dayman, and by the U.S.S. *Arctic*, commanded by Lieut. Berryman, which tended to show that there is a sudden descent about 180 miles off the coast of Ireland, of from 550 fathoms deep to 1,750 fathoms, and at this point it was considered by many that the cable received an injury from its being laid too taut. Orders were given on board, that when approaching this spot a good deal of slack was to be paid out, so that the cable might lay flat, and not be strained or suspended upon any ridge. This direction, however, was not sufficiently attended to, as the spot was passed during the night, and was not observed until the diminished strain upon the cable indicated shallow water.

Further soundings in H.M.S. *Porcupine*, in June, July, and August, last year, by Captain Hoskins, were made, with a view to find a more gradual slope into the bed of the ocean, and it is most satisfactory to report that by going more to the west, between Bantry and Blacksod Bay, a descent into the ocean is formed, varying from 6 to 19 feet dip in 100 feet horizontal.

Soundings have also been made by the American Government off the coast of Newfoundland, by Captain Orlebor, and a channel is found to exist from the approach to Trinity Bay to a place called New Pelican, where there exists every facility for landing, &c., and by adopting this terminus upwards of 50 miles of cable will be saved.

The results of these soundings, and the great progress generally effected in all branches of the science of telegraphy, as well as the consideration of an offer made to the company by the eminent cable manufacturers, Messrs. Glass, Elliott, and Co., that if they were selected to manufacture and lay the cable, they will undertake to keep it in working order for one year, and not only take shares for the amount of their profit, but also pay cash to the extent of £25,000 for shares, have induced the directors again to come forward and solicit public support for a new cable, which appeal I am happy to state is being responded to in a most liberal and encouraging manner.

The Company have most wisely appointed a Scientific Consulting Committee, consisting of Mr. Fairbairn, Mr. Joseph Whitworth, Prof. Wheatstone, and Prof. Thomson, in whose hands the selection of a suitable cable, and other matters of scientific interest appertaining thereto, may very properly be left.

It has been remarked that, although the Atlantic Company have appointed a Committee of great engineering and scientific ability to assist in determining the selection of a cable, yet a similar Committee of nautical gentlemen might also have been invited to assist at their councils. This, I apprehend, will be the case when the time arrives for active measures to be taken, the fact being, I have no doubt, that the Atlantic Company felt a difficulty in selecting a few out of the very large number of eminent and distinguished officers in H.M. navy.

The next route is the northern one, *viâ* Scotland, Faroe Islands, Iceland and Greenland (a distance of about 1,700 miles.) It appears that in 1854 Colonel Shaffner traced out a route and obtained a concession from the King of Denmark for permission to land a cable upon his territories. Nothing was, however, done beyond this till 1859, when Colonel Shaffner having chartered the barque *Wyman*, made a personal survey of the route. His survey was such that Her Majesty's Government was memorialised to have soundings made, and in June, 1860, Her Majesty's ship *Bulldog*, commanded by Sir Leopold McClintock, started to survey the deep seas for the proposed telegraph. He reported that from Scotland to the Faroe Islands the depths did not exceed 254 fathoms; from thence to Iceland the maximum depth was 683 fathoms; from Iceland to Greenland it was 1,200 fathoms; Greenland to Labrador 2,000 fathoms, whilst the bottom throughout appeared to be of fine sand and soft mud.

As Sir Leopold McClintock's instructions had reference only to the deep sea soundings, a second expedition was fitted out, and this time at the cost of the promoters, to survey the different coasts, and to obtain all other necessary information. This expedition started in the celebrated steam yacht *Fox*, under the command of Captain Young. Still, however, it appears neither of the expeditions entered upon any very detailed survey, owing to the weather, and another must undoubtedly be carried out before a cable could be laid.

The promoters of this route have advanced many arguments, upon the ground of short lengths of cable, in its favour, and against the adoption of the old route from Ireland from the causes of induction, but they say nothing themselves about overcoming the difficulty which the magnetic currents of the earth will occasion to the working of their cables. Yet this, in the opinion of those well versed in the science, is likely to prove in the land of the *aurora borealis* a very formidable obstacle, independently of the danger from icebergs and the difficulty of repairing at all seasons any accident to the cable. Still, notwithstanding these difficulties, with the wonderful inventions which are every day being perfected, I believe that at some future and no distant time a cable may be laid by this route.

I now come to the Spanish or South Atlantic route (a distance of upwards of 2,000 miles), to which that Government has promised a large subsidy upon the capital required, so soon as the cable is laid. It starts from Cape St. Vincent to Madeira, thence to the Canary Islands, Cape de Verd Islands, then across the Atlantic to the Island of St. Paul's, to Cape St. Roque. This is another route advocated upon the ground of short length, the longest section being about 900 miles. This line has not been specially surveyed for the purpose, but from the soundings laid down in Lieutenant Maury's chart, it appears that the only deep water to be found along the whole route is that near the Island of St. Paul's, which gives a depth of 3 miles. Still, if a survey was made, it is not unreasonable to anticipate that by going either to the north or south a less deep descent might be found; but another obstacle presents itself, and that is, the heat of the Gulf Stream, which will pass over the cable, and may affect the gutta percha. This, however, is only a supposition, and I hope it will not prove correct, and that no insuperable barrier may exist to the successful working of this line also.

I now come to another route, which proposes to start from the coast of France, probably Brest, to the Azores, thence to the Island of Bermuda, to Cape St. Hatteras, which would make a distance of 3,000 miles. This route has not been especially surveyed for this object, and the scheme is thought by some to be perfectly impracticable; first, owing to the great distance and depth (soundings to 7,000 fathoms having been made with "no bottom"); secondly, from the fact that the Azores are volcanic, so that it would be dangerous to lay a cable in their immediate neighbourhood, as a few years since an island disappeared altogether.

This project, however, as I was recently informed, on credible authority, has been abandoned in favour of a direct line from France to the Island of St. Pierre, which belongs to France, and lies off the coast of Newfoundland. I am also given to understand that the Emperor of the French has so far patronised this latter plan, as to promise a considerable subsidy annually upon the capital required for its accomplishment. Already, indeed, active measures have been adopted to form a company and to commence operations forthwith. It is calculated that this direct line would not exceed 2,000 miles in length.

With regard to the practicability of this project, as, indeed, of any other, I would quote some remarks of Lieut. Maury, in his work on the physical geography of the sea, which apply universally. He says:—

"I have no doubt whatever as to the ultimate success of a telegraph across the Atlantic. Indeed, the only

limit to our power to establish, at pleasure, lines of submarine telegraph, is the limit, if any, which nature herself may have interposed upon the galvanic current.

"The sea offers no obstruction on account of its depths or its currents to lines of any length. A line with an unbroken conducting wire across the Atlantic or Pacific is as practicable as one across the Alps or Andes.

"The real question for future projectors of lines of submarine telegraphs is not how deep, or how boisterous, or how wide the sea is, but what are the electrical limits to the length of submarine lines."

I will also call your attention to a remark by the same great authority relative to the pressure of the ocean upon a cable. He says, at page 343, "the pressure on the telegraph plateau between Newfoundland and Ireland varies from 200 to 300 atmospheres, that is, from 430,000 to 650,000 pounds to the square foot. Chemical forces may be measured and consequently overcome by pressure, for the gases generated by chemical decomposition are themselves capable of exerting in the process of that decomposition only so much pressure, but if we subject them to a greater pressure they cannot separate, and decomposition cannot take place."

In proof of this I refer to a recent discovery of Ehrenberg. In the specimens obtained at a great depth from the Mediterranean, that celebrated microscopist has distinctly recognised fresh water shells with flesh in them, from which interesting fact we may infer that the very volatile gases which enter into composition for the formation of the fleshy parts of marine animalculæ are subjected to such a pressure upon the bed of the ocean that they cannot separate. If this inference be correct, and it doubtless is, may we not proceed a step further, and conclude with reason, that with the pressure of the deep sea upon it, the gutta percha used for insulating submarine wires becomes "impervious to decay." This remark has been fully borne out by experience, as it is found that gutta percha, under pressure, greatly improves in condition, and has never been known to show the slightest symptoms of decay under water.

I now come to the consideration of the fifth and last route to America, which may be termed the overland route, and of which upwards of 5,000 miles have already been completed through Russia and Siberia, *via* Ormsk, the Ural Mountains, to Irkutsk, whilst next year the line will be completed to Nikolaevske and the Amoor, giving a telegraphic communication from Japan to Europe.

From Nikolaevske a submarine cable would be laid to Kamtschatka, then from Petropaulovsk to the several Aleutic Islands, 12 in number, thence extended a distance of about 1,900 miles to the Peninsula of Aliaska, from whence a land line would be continued to California, to which point the line is now open from New York.

On looking at the map at first sight, a shorter submarine route would be found across the Behring Straits, a distance of only 50 miles, but the impracticability of carrying out such a line arises from the nature of the countries around Behring Straits and the North-Western part of America, through which the aërial lines would have to be constructed. They are so wild, and so covered with perpetual snow and ice, that even the maintenance as well as the construction would be impossible, quite independent of the magnetic influence which affects the line. It is therefore proposed to carry the line *via* Kamtschatka and the Aleutic Islands, but when this will be accomplished it is impossible to say; still the Russian Government is pushing on their works, and next year they may have reached Irkutsk.

I have now briefly reviewed the subject, but I have a few words to say about the proposed cables, and telegraphing to America or elsewhere without the aid of wires at all. Hundreds of patents have been taken out for different kinds of cables, but the original spiral form of twisted wires for the outer covering, first adopted by Mr. Brett, still keeps its ground. It is impossible to say what form of cable will be adopted for the new Atlantic line; but no doubt every experiment and trial will be carefully made, and no expense spared to arrive at a satisfactory result; and when a suitable cable has been decided upon, and a careful supervision given to its manufacture, there can be no doubt that it will be successfully laid. Amongst other new inventions is that of Mr. Duncan's Ratan Cable, which he advocates upon the grounds of its flexibility without elasticity, of its being imperishable in water, and of the cheapness at which it can be manufactured.

Another form of cable, containing some new combinations, has been adopted by the Indian Government for their cable of 800 miles down the Persian Gulf. The novelty which it possesses is in the manufacture of the copper wire, which is a single wire instead of a strand of several, so much advocated, as affording great additional strength, and avoiding the possibility of a total fracture at one particular spot. But a strand has this disadvantage—that if one wire breaks, the sharp points are liable to start out and pierce through the gutta-percha. Want of solidity is also urged against a strand, as it is alleged that if water penetrate in any place to the wire it will pass along the wire as in a tube. To remedy this defect, the Gutta-percha Company propose to coat the central wire of the strand with Chatterton's compound, and bed the wire in it during the process of twisting.

Mr. Daft proposes to obtain the same object by bedding copper wires coated with brass in vulcanised india-rubber.

Mr. Varley proposes using three or more insulated wires joined together at different distances. If any one wire (or two wires) be exposed by injury to the water, the current will eat it away, and thus increase the resistance of the escape without increasing sensibly the line,—the more the wire is eaten away the better the cable becomes. Such a cable may be defective in 20 places, and yet work perfectly.

Mr. Newall unites the several wires of a strand with solder.

Mr. Latimer Clark, who, with Sir Charles Bright, are appointed engineers of the Indian Government, proposes to obtain this solidity by making the conductor in the shape of a solid wire, divided into three or four sections, longitudinally fitted, and rolled into each other, and they have adopted this form in the Persian Gulf cable now being manufactured by Mr. W. T. Henley.

The outside covering of iron wire is the old form, but it also is now coated with hemp, and a tarry composition to protect the iron from rusting, a plan which will be universally adopted in future after the experience gained with the Atlantic and Red Sea lines.

But while various parties have been at work devising new cables, another gentleman, a Mr. Haworth, has been at work to discover a means of conveying electric signals without any wires at all. He has taken out a patent and filed drawings of the apparatus, but I have not met one single gentleman connected with the science of telegraphy who could understand his process of action, or its probability of success, although the theory is an old one. I applied to him for some information relative to his experiments, but he is unwilling to communicate any particulars until the success of his plans has sufficiently demonstrated their practicability.

With respect to the comparative merits of gutta-percha and india-rubber I may remark that one of the earliest substances used for insulating purposes was india-rubber, but owing to the difficulty of efficiently covering the wire, and from the oxidation which took place when it was exposed to the atmosphere, it fell into disuse after the introduction of gutta-percha, and although universally admitted to contain insulating properties far above any other substance, no attempts, I believe, were made for several years to perfect it for telegraphic purposes.

Messrs. Silver have, however, in the last few years, turned their attention to the subject, and have been re-

warded by producing a substance called ebonite, which is being universally used for various insulating purposes.

They have also arrived at a perfection not hitherto obtained in covering wire. A mile length prepared by the Messrs. Silver was submitted to the Government Scientific Committee, and reported on by them as containing the highest insulation ever attained.

They state in the report, "That india-rubber surpasses all other materials in the smallness of the amount of its inductive discharge, and the perfectness of its insulation." Although this testimony carries great weight, yet the substance itself has not hitherto proved very durable, nor has it been adopted to any great extent, but the manufacturers are sanguine enough to believe that with the present and other improvements which may be made, it will one day surpass everything else.

As regards gutta-percha, no vegetable substance has yet been discovered which presents the same advantages to the electrician as this gum. Its many valuable properties are too well known to mention; suffice it to say that it has never been known to decay under water, and, as far as experience goes, it may in that case be said to be indestructible when suitably protected. The manufacture of the article has now arrived at a perfection to leave nothing to be desired but that the supply may not fail.

At a recent repairing operation in the case of the Belgian cable (made by Mr. France, the Submarine Company's engineer), and which was broken by a ship's anchor, it was found that, although the large iron wires of the outer covering were broken, as well as the internal copper conductor, yet so tenacious was the gutta-percha, that it resisted the enormous strain, allowing itself to be literally drawn out from the thickness of a piece of macaroni to an attenuated shred of vermicelli, thus adding another fact to those already established of its indestructibility under water, and its superiority over all other insulating materials for sub-marine cables.

The Submarine Telegraph Company liberally offered the use of their wires to connect the Society's rooms this evening with all the capitals of Europe, but upon applying to the engineer to make the necessary arrangements, it was found impracticable, without great difficulty and expense, owing to the wires of the Company being laid under the roadway in the Strand.

I regret this very much, as I had anticipated repeating an experiment which I witnessed some time since, namely, that of sending a telegram over the longest distance of land, and through the greatest extent of sea that was then possible. The experiment was so wonderful and interesting that it will bear relating, as showing what can be accomplished by the aid of electricity, although it does not refer immediately to the Atlantic cable.

A continuous wire was joined up from London to the island of Corfu, a distance of nearly 2,000 miles, but as the wire had necessarily to be suspended from hundreds of poles, extending over such a great distance, and where perhaps at every connection a small amount of electric fluid would escape, the charge would not last out to reach its destination without some additional assistance on the road. It therefore becomes necessary in such operations to refresh and invigorate the lightning, as in the old slow time a man would water his horses on the road, or as the Brighton "Age" would, in its then wonderful journeys, "change horses in half a minute."

To provide this assistance, instruments called "relays" were placed at different intervals along the line, the object of which was to receive the nearly exhausted current of electricity, revive it instantaneously with additional strength, and send it on to the next relay, and so on till it arrived at its destination.

In order to fully realise this wonderful achievement, we will trace the progress of a message along the route from London to Corfu.

The transmitting instrument in connection with the battery generating the electricity is set in motion. A flash of electricity is liberated, and wings it way along an insulated wire, under the busy streets of London, and under the now quiet turnpike roads to Dover, then under the surging waves through the submarine cable, peacefully lying at the bottom of the Channel, to Calais, were it mounts up to land again, traverses the intermediate country to Paris, picks up a relay of electricity charged from a local battery in waiting to revive its now languishing strength; and, reinvigorated, pursues its silent and instantaneous flight through cities and towns without stopping, but every now and then receiving assistance and new life, till it arrives at Turin; thence on to Genoa, from whence with increased power it dashes through the submarine cable, 100 miles in length, to Corsica, rushes over this island in the quickness of a thought, descends again into the sea, across the Straits of Bonifacio to Sardinia, up on land again, through villages, and over the Gallura Mountains, where the deadly malaria fever lurks, that killed so many men in its construction, to the eastermost point of this island; then again taking a header through another submarine cable lying at the bottom of the deepest part of the Mediterranean to Malta, over its rocky ridges to the other side, from whence it finally flashes through another submarine cable under the sea to its destination, Corfu, doing the whole distance of 2,000 miles in two seconds and-a-half, and passing over, in its transit, some of the highest mountains in Europe, as well as five times descending more than a mile's depth into the ocean.

But the coming back of this mysterious agent is still more wonderful than its guided transit along the wire; for there it has an operator, philosopher, guide, and friend to direct its course; but now it returns home again, not along a conductor supplied by a man's ingenuity, but alone through the earth. "The world is all before it where to choose," for after it has reached its destination and recorded its symbolic mission, it is transmitted down a wire, sunk in the earth for that purpose, to find its mysterious way back to the spot from whence it started, and passes up another wire similarly placed in the ground, again into the presence and power of the operator; for, until it has arrived at home, the electric circuit is not completed and no signal is given.

Wave after wave of electricity was transmitted, until the whole message of some twenty words had been communicated to the island of Corfu, the transit of the whole occupying three minutes; then a brief interval, and click, click, the serpentine length of paper unwinds itself, containing the reply, which came back in even less time than the message sent.

Having now briefly reviewed the subject of submarine telegraphs generally, and the Atlantic in particular, with some, I trust, pardonable digressions, I shall proceed to sum up my conclusions in as few words as possible.

1. First, then, with respect to the original cable, I cordially acquiesce in the resolutions arrived at by the Committee appointed by the Board of Trade, that "the failure of the enterprise was to be attributed to the original design of the cable having been faulty, owing to the absence of experimental data; to the manufacture having been conducted without supervision; and to the cable not having been handled, after manufacture, with sufficient care."

2. That intercommunication between the Old and the New World, by means of an Atlantic telegraph, is not more desirable than feasible.

3. That the accidents which befel the first cable arose from causes which there is every reason to believe will not occur again.

4. That the improvements in the process of manufacture of the cable itself, as well as of the insulating medium, have greatly enhanced the value of both, and in the latter case to an extent of 10 to 1, as compared with the insulating medium of 1857.

5. That we are no longer exposed to the mercy of the

elements in the matter of laying and paying out the cable, as on the previous occasion, the *Great Eastern* having obviated the serious danger and difficulties hitherto experienced from the pitching of vessels employed in these operations, and by which, through the strain upon the cable, success was rendered highly problematical.

6. That the above conclusions are borne out by the liberal proposals of those eminent and successful cable manufacturers, Messrs. Glass, Elliott, and Co., to which I have before alluded.

7. That recent experiments fully demonstrate the possibility of working a one-wire cable commercially; but that it will be cheaper in the end for the Atlantic Company to lay a cable consisting of at least two if not three wires, because there will be such an influx of messages both ways, that, if a one-wire cable only is laid, telegrams will have to wait two or three days before they can be sent. The chances of success would also be greatly enhanced by having more than one wire.

8. That of all the various routes contemplated, that between Ireland and Newfoundland presents advantages superior to any other.

9. That considering the issues at stake, the present state of the science of telegraphy, and the fact that it has already interfered to point out the causes of the former failure, and the remedies to be adopted in any subsequent undertaking, Government might reasonably be called upon for another grant, at all events, to perfect the experiments necessary in a second and successful attempt to lay down the Atlantic Telegraph.

10. That the time has fully come when that attempt should be prosecuted in the interests not only of science, commerce, and social economy, but also from a regard to the still higher interests of civilization and humanity.

In conclusion, I indulge a fervent hope that those who have sacrificed so much already, and who, nevertheless, are prepared to risk still more to carry out this great work, may in the end reap the full reward of all their noble enterprize. Should, however, that pecuniary reward be wanting, of this I am well assured, that the consciousness of being pioneers on the high road to peace and amity among the nations of the earth, and above all, between the different families of the great Anglo-Saxon race, will be to them a source of satisfaction, alike deep and permanent. I shall only add the expression of a wish, in which I am certain all here will join, that our kindred across the Atlantic, diverted from scenes of fratricidal strife and bloodshed, may ere long turn their thoughts back again to such subjects as I have been discussing this evening.

DISCUSSION.

The Chairman said it was now his duty to invite discussion upon the very interesting historical account of the Submarine Telegraph with which they had been favoured this evening. He was old enough to recollect the time when not only submarine telegraphs, but electric-telegraphy itself was a matter of doubt, when grave reasons were advanced which appeared very plausible at the time against the electric telegraph being in any sense practicable. The difficulties of insulation, the resistance of long lengths of wires, and the difficulty of obtaining an insulating medium which would not only resist the effects of time, but also the liability to fracture, seemed to render it problematic whether they should ever succeed with the electric telegraph at all. They were, however, now so accustomed to this mode of communication, that they had long ceased to think of the difficulties which attended its first introduction, and they were now extending their lines further and further till they had not only established the electric telegraph as a means of land communication over an enormous network of territory (and up to this time he had imagined it had been carried to a greater extent than the 6,300 miles mentioned in the paper, although this was a considerable distance, looking at the comparative short period during which the system had been in existence), but they had also very long distances of submarine telegraphs; and they had practically established the fact that it was possible to communicate signals across the Atlantic, a distance of about 2,000 miles. If they could effect the successful laying of the cable, there was nothing to prevent the communication of signals through that length of submarine wire. The difficulty had now become comparatively small, for as soon as it was known that the result could be effected, the rendering of that result of a more permanent character was only a work of time. There were two questions which appeared to be the principal ones opened for discussion by the paper: one was the best practical route to be adopted. Mr. Masey had expressed an opinion in favour of the direct route from Valentia to Newfoundland. There were many other persons who considered the route by Iceland and Greenland presented advantages over that from the coast of Ireland to Newfoundland. With regard to the Iceland route, objections had been mentioned in the paper respecting the magnetic influences which might be exercised upon the telegraph by the aurora borealis in those regions; but it had not been explained why those influences should exist to a greater extent in the Iceland route than in the other. It was true that the aurora borealis was supposed to have increased effect the nearer they approached the poles, but at the same time the difference of latitude between London and Iceland was so small that they could hardly suppose that the influences of those currents would have any greatly increased effect. He did not know whether experiments had been made on a sufficiently large scale to prove that that phenomenon exercised the effects upon the wire which were ascribed to it, and he was quite sure many gentleman present would be glad to receive some further information on that subject. If it should be found that the fears on this head were groundless, by the adoption of the Iceland route the line would be divided into three great divisions, so that if an accident occurred they would have only one-third of the line to deal with. Another subject which had occupied the attention of all electricians was the means of insulating and protecting the conducting wire. Had it not been for the discovery of gutta-percha, they would now be a good way off the point of perfection at which they had at present arrived in electric telegraphs. Gutta-percha had been proved to be a good insulator; it was elastic, but not to too great an extent, and was capable of sustaining the influences of time and exposure under water without injury, and would bear a great amount of pressure without cracking like glass or pitch, and it was, upon the whole, a very appropriate medium of insulation. It seemed to have come just in time to enable us to carry out those discoveries which had been made in submarine telegraphy. In addition to this, they had a second element of consideration, viz., the means of protecting the insulated core of the cable by an outer covering of iron wire or other material to preserve it from injury after it had been submerged. The larger the amount of information that could be gained on these subjects the better, seeing that another atttempt would, in all probability, be made ere long to carry a cable across the Atlantic, and he hoped this discussion would result in information of a valuable and practical character being imparted on these highly important subjects.

Rear-Admiral Elliott would not have ventured to address the meeting on this subject were it not that he considered it to consist of two distinct elements, the scientific element and the practical element; and upon the latter, which had reference to the laying of the cable after it was completed, he thought he might be allowed to form some opinion. He had heard with the greatest pleasure the very able paper which had been read that evening, but there were one or two points on which he differed from Mr. Masey, and it was but fair that he should express them at once. There was one point which he thought had been omitted altogether. With regard to the failure in the laying down of the Atlantic cable different

reasons had been assigned; but he thought the practical reason of this failure was that the weight of the cable was so great, that if the cable itself had been perfect in a scientific point of view, in a practical point of view it would have been destroyed by its own weight, and he thought if the cable before them (a thick one) was that which it was proposed to lay down on a future occasion, he feared that its own weight would destroy it. He would not say one word in disparagement of the Atlantic Telegraph Company; on the contrary, he thought they were deserving of all honour as pioneers in this undertaking, and their persevering efforts to repeat the experiment after the misfortune that befel them deserved the greatest credit; but there was a wide field open for other undertakings of the kind, and any other company which sought to carry out the same object ought to regard with a favourable eye the exertions of the Atlantic Telegraph Company, and, benefiting by past experience, he hoped they would go hand in hand with them. The field was large enough for all. If twenty cables were laid down, he hardly thought they would be able to supply the demand. It had been mentioned by Mr. Masey that another cable was being formed by a new company, and he truly gave, to a certain extent, the projects of that company; but he was mistaken on some points. In the first place, it was true that the proposed route was not the same as that which had been taken by the Atlantic Telegraph Company. It was to leave Brest and to touch at the Island of St. Pierre. He believed that the French Government had regarded that route favourably, and had given a concession for the lengthened period of fifty years, and that a subvention would be granted, so that he trusted that company would soon be in honourable competition with the Atlantic company; and if both succeeded, there would still be room for many more cables. It had been lately proposed that a survey should be made previous to any other undertaking being previously commenced; and he had recently heard a paper read before another society, in which it was proposed that a belt of five miles across the Atlantic should be surveyed, which should be completed before any other cable was laid down, and he understood that application had been made to the Government for the grant of vessels for that survey. On the occasion to which he referred he saw a line laid down on a map representing the line of soundings which Captain Dayman took across the Atlantic. He was of opinion that if they could make an accurate survey of a belt of five miles, and if they could ensure that the vessels laying the cable could keep that line, it might be desirable to delay the operations till that survey was made; but he believed if a vessel started from the coast of Ireland with the best navigators in the world, and the best instruments that could be obtained, it would be totally impossible to keep within that belt of five miles. The action of the wind and the currents, and other influences, made it almost impossible for a vessel to be kept within that belt; and even if this could be done, it was questionable whether such a survey would render it possible to avoid the inequalities of the bottom, so as to prevent injury to the cable. With regard to the cable itself, he had conversed with a great number of electricians, the most scientific men of the day; and it appeared to him that the scientific element was further advanced than the practical element. They approached very near to agreement with regard to the core of the cable, but when they came to the strain upon that core, and to the protecting covering of the cable, they all seemed to disagree. He had already said he believed the great weight of the cable was an element of self-destruction, and that another cable of the same kind would be destroyed by the same means, even if the most perfect results in the manufacture were secured. He thought he might say it was owing to the failure of the first cable that a second company had been projected whose object was to employ a cable of less specific gravity, and he did not see what possible objection there could be to it. The question of the outer covering of the cable was one which he was most anxious to see satisfactorily determined. If it could be proved that beyond a certain depth the cable did not require protection from marine insects, the difficulty could easily be got over; but when they came to question the men of science of the day, none of them would say that the cable was not liable to the attacks of those insects, and they knew if worms were there, they would eat the hempen covering of a cable into shreds. He felt certain, therefore, there must be some better kind of protection for the cable; he considered iron was too weighty for the purpose, and at certain depths, instead of adding to the strength of the cable, it was in itself an element of weakness, because the greater the weight the greater the power of the momentum would be, and the heavier the cable was the greater would be the strain upon it in paying it out. Professor Wheatstone had prepared a cable which might be laid at the bottom of the sea, and answer all practical purposes, and would cost only half the amount of the former cable, if only they could be satisfied that it would be secure from the attacks of insects; but they knew that crabs and other marine animals had been brought up from great depths; and a gentleman in Paris had produced a glass of sulphate of copper with a long living worm in it, notwithstanding it had been supposed hitherto that sulphate of copper was the best preservative of hemp from the attacks of those insects. He was therefore brought to the conclusion that if an outer covering were required for the cable, it must be a metallic one.

Dr. Wallich said, although he was prepared to afford all the information he could with reference to the deep-sea bed, he had no idea that he should be called upon to defend some propositions which had been laid by him before the Geographical Society. The main fact with which he started was this, that the evidence with regard to the nature and contour of the deep-sea bed was wholly inadequate to the requirements of ocean telegraphy. Two lines of survey of the Atlantic had already been made, one by Lieutenant Berryman, and the other by Captain Dayman. That of Lieutenant Berryman was unfortunately found to be untrustworthy. The committee of the United States navy gave a distinct opinion that the discrepancies between the log, the chart, and the report were so great, that the line of soundings could not be relied upon. We had, therefore, to fall back upon the single line of survey taken by one of our own naval officers, Captain Dayman, but when he mentioned that in an area extending over 1,300 geographical miles, only 41 soundings were taken at intervals of from 30 to 70 geographical miles, every one must be aware that in those intervals where no soundings were taken, alterations of level might exist of sufficient extent to be dangerous and fatal to a cable. He had lately brought before the Geographical Society a proposition which was intended to obviate the insufficiency of the surveys already made. Even if Capt. Dayman's line of soundings were considered sufficient, if the cable could be laid absolutely along that line, he should like to know how the ship which was to pay out the cable could follow accurately in the wake of the ship in which the survey was taken? To obviate this he proposed that a belt, not of five miles, but of two miles, should be surveyed. The question had been raised that evening whether it was practicable for a ship to be kept within the course of a belt acrss an extensive area like the Atlantic. Having read an extract from the report of Sir Leopold McClintock on this subject, which favoured the view that a ship could be kept within the two mile belt, Dr. Wallich added, that what he proposed was that two vessels should undertake the survey of a belt of two miles across the Atlantic, to sail in parallel courses, and to take alternate soundings at five mile intervals, so that when the intervals were five miles, the diagonal intervals between the soundings on the two opposite lines would be only about two miles and a half; so that instead of intervals of 40 miles he proposed intervals of only 2½ miles

and in the place of 41 soundings, there should be 700 soundings, which could be accomplished in about five months and a half, at the rate of about three soundings per day. He would put it to the meeting whether it would not be more satisfactory to await the results of such a survey as he had suggested before consigning another half million of money to the bottom of the Atlantic?

Admiral Sir E. BELCHER wished to offer a few observations on several of the subjects which had been started. First with regard to the aurora. In the year 1825, when employed in Behrings Straits, with the late Admiral Beechey, every effort was made to trace the disturbance of the magnetic needle during the most brilliant exhibitions of the aurora, but without detecting the most minute disturbance. In the last Arctic search by Government, the most delicate magnetometers, acting precisely as those described by Mr. Masey, by reflection over great arcs, were used during two years, with observers noting every $2\frac{1}{2}$ minutes during the dark season for disturbances generally. Many disturbances were noted, but none were detected during the visits of the aurora. He, therefore, refused to give any credit to the statement that the aurora produced an electric disturbance in cables under water. Next as to the course to be selected for laying the cable. If it was to be laid on the shortest line, that by great circle sailing was the best, and he was satisfied that by adopting the apparent northerly arc from the Faroe Islands, skirting Iceland and Greenland, the actual distance would be shortened between the extreme land ends in comparison with that proposed hitherto, by at least 250 miles. Then as to deep-sea soundings. Landsmen imagined it a very simple operation; naval surveyors knew to the contrary. It was supposed to be a very simple act to throw overboard a lead with line attached, and to reach the bottom vertically. But so faulty was this mode, that Massey, Burt, Ericsson, and others, invented machines by which the actual vertical passage of the lead alone was measured. But this demanded that three times the length of slack should be thrown overboard, and no positive sensation as to when the lead first struck ground was obtained; consequently, in the case of a lead striking on a steep incline, it might afterwards slide down to the bottom, and no indication whatever of a peak, even close to the surface, would be obtained. But another important problem was involved. It was generally imagined that currents were merely superficial. That was a grave error, and one well recorded fact was worth a thousand assertions or theories. Some of his officers were there present who had taken part in delicate operations of this nature, and would speak for themselves. The very important duty had been especially entrusted to him by government, "to determine at what depth the strongest currents begin to vary." He selected a calm when about 10 miles off the Cape de Verd on the Coast of Africa, where a five-knot current ran. Five boats were lowered, with lines of 200, 400, 600, 800, and 1,000 fathoms respectively; a deep sea lead of 28lbs. in a basket was attached to each, and each line buoyed by a cask, with a flag-staff and flag, in order to measure their positions relatively with each other as to drift. The ship had the deep sea-sounding bottle attached at 1,200 fathoms. At the expiration of two hours the whole had drifted ten miles past the Cape, but the ship and boats were nearly relatively in their same positions. Therefore, as deep as 1,200 fathoms, the current ran with the same velocity. There were many other cases which he would pass over. In 1838, when perfectly calm, the water bottle and other thermometers were sent down in 1,200 fathoms off the Galapagos, on the Equator in the Pacific. The line was perpendicular, yet the ship was drifting swiftly past the islands. In both these cases reliable landmarks were available to determine the rate of drift; but at sea, who could determine this? Now, as to the rate of descent, it would be found (see p. 796, "Nautical Magazine," 1843), that it required 2 hours, 13 min., 22 sec., for a lead of 12lbs., with a fine whipcord line attached, to descend 3,000 fathoms. What would a mere 28lb. lead require with a line strong enough to recover it, and what time would be consumed in hauling it in steadily to prevent jarring, as well as stopping to disengage thermometers, if the operation was to be accompanied by scientific research? It was all very well to talk about scientific officers, and scientific observers, but who could test their value? With a set of ten observers, even with the simple observation at noon for the latitude, he had witnessed miles of discrepancy, and when it came to fix positions—hours before or after noon—he felt no confidence in any observer. It was all mere guess-work; therefore the idea of following out any given lines on the pathless ocean was a mere speculative dream. If they required the true survey of the line betwn the two Continents, to lay down the cable, let them attach very slender lines at certain distances, with floating reels, and let a small vessel follow and pick them up, noting each true depth, but losing the lines. He had used the simple cotton reels, containing 200 yards, or 100 fathoms each, adding others as the depth required, and obtained truer soundings than the great lead line would effect. The length of the lines supplied by Government for this purpose exceeded the circumference of the globe, and yet the cost did not exceed £15. That, therefore, was the cheapest as well as the only mode by which any reliable survey of a line across the Atlantic could be effected. If we had enough data for laying down these electric cables, he saw no reason to incur such enormous expense by mapping the Atlantic, and blotting our charts with soundings, which were placed merely at haphazard.

Colonel SHAFFNER rose for the purpose of correcting one or two errors contained in the paper. On behalf of his countryman, Mr. Morse, he might be permitted to correct the statements of Mr. Masey with regard to the dates of that gentleman's inventions. Credit had been given to Mr. Morse for inventing his process of telegraphing in 1843, whereas it was in 1832. His application for a patent in America was made in 1837; his French patent was dated 1838, and a subsequent patent taken out in America was dated 1840; and the first telegraph line was constructed by Mr. Morse in 1841. As an old associate of that gentleman, he felt it his duty to make these corrections of dates relative to his inventions in telegraphy. With regard to the North Atlantic route, in which he (Colonel Shaffner) took great interest, it was stated in the paper that no results were obtained by the surveys of the *Bulldog* and the *Fox*, in the year 1860. In that year Sir Leopold M'Clintock surveyed the route between Scotland and the Faroe Islands, and thence to Iceland, Greenland, and Labrador; and the result was, that Sir E. Belcher and others were of opinion that it was a practical route for a line of telegraph to be carried, and so favourably had it been regarded, that he was informed by friends who had the enterprise in charge, that they had one-fourth of the capital in hand for the construction of a cable to be carried by that route. They offered no opposition to any other route. In the early days of telegraphy he was of opinion that monopoly in such matters was beneficial, but he was of a different opinion now. He should be delighted to see all the projects for telegraph communication with America carried out, and if they were accomplished, he believed all would be benefited, and the public would be better served. He wished success to them all.

Captain SELWYN, R.N., said he believed he was known to some of the telegraphists present, as having proposed a different mode of submerging cables to that which had been generally adopted, but he would not refer to this, but would confine his observations to the matters treated of in the paper, and whilst he expressed his admiration of the comprehensive and extremely careful manner in which Mr. Masey had furnished them with the history of what had been done up to this time, there were some points in that history to which he entirely demurred.

With regard to the soundings taken by Captain Dayman, although they were a considerable distance apart, they resulted in laying down a line from Ireland across the Atlantic, which, so far from being precipitous, had a descent of only 1 in 16, whilst the greatest descent which was found by the *Porcupine* was 1 in 19, neither of which gradients he thought was to be feared in the laying down of a cable. Mr. Masey had ably remarked upon the probable causes which led to the failure of the Atlantic cable, and had fairly expressed his opinion as to how that might have been expected to have taken place, but he begged to add to those remarks that in that failure, evidence was afforded that the outer wires to which they trusted for strength failed in their object, and permitted the internal core to become separated. He was the more induced to refer to this point, because he found that there was still a disposition to adhere to the mechanical fallacy of surrounding a straight core with a spiral covering, and then expecting the covering to take the strain, which, of course, it could not do. If they could prevent corrosion from the water and abrasion from the bed of the ocean, by the interposition of other material than iron, he questioned whether the wire covering answered any good purpose, as it was known that iron wire corroded more rapidly in salt water than in fresh, and, therefore, cables of that character required a covering of hemp or other tarred material. Then came the question, with a cable of that bulk and weight, what description of ship must be employed to pay it out. The *Great Eastern* herself could not take such a cable on board. The *Agamemnon* could only carry a portion of the last Atlantic cable in her hold, and was obliged to carry a heavy deck coil; and he was told by an officer who accompanied the expedition that if it had been possible, they would, at one time, have hove that part of the cable overboard to ease the ship. He thought, although the failure of the cable might be, in some measure, attributable to the coiling, it was still more due to the want of strength in its construction. In determining the route along which a cable should be laid, one great consideration was to provide for the landing of the ends in positions where they were not exposed to the fouling of anchors, and with that view a locality should be sought for where there was such a depth of water as would avoid such a risk. The shore ends would always remain a difficulty so long as they selected sandy bays or shoals for the landing. If they wished to preserve the cable from the injuries to which it was generally exposed at the ends, they ought never to take it where there was less than 100 fathoms water, and the more precipitous the shore was the safer it would be, even to the extent of carrying the cable up the face of a steep rock. There was one route which he thought worthy of consideration which had not been mentioned,—that was about 300 miles to the eastward of the great bank of Newfoundland, which was to be avoided because the fishing smacks anchored upon it. At the locality he referred to they might lay the land end of the cable in from 50 to 100 or 200 fathoms, and it was quite practicable to lay it in that depth of water, and be able to pick it up again if necessary; from thence they might run it to the more distant shore, whether at Halifax or elsewhere. He denied those conclusions which pointed to the idea that nautical men could carry on any other operations at sea than by the mercy of Divine Providence, for no human contrivance could carry a cable across the ocean in the face of the elements. Captain Selwyn having described the effects which the pitching of a vessel in a gale had upon the paying out of a cable in the production of kinks, which occasioned so much damage to the cable, concluded by remarking that by the plan he had introduced for coiling the cable, preparatory to its being laid, it could be kept in water from the time of its manufacture until it was laid down, and in the paying out, if the cable broke within six miles of the stern of the vessel it could be caught and retained. In the event of a nautical assessor being appointed on any future committee upon this subject, he hoped to have the honour of explaining his invention to that gentleman, and to have the opportunity of substantiating opinions which had received the sanction of many of the most eminent members of his profession, some of whom had had large experience in the laying down of cables.

Mr. MACKINTOSH had listened with great pleasure to the interesting discussion which had taken place that evening on the subject of submarine telegraphy, but the speakers had omitted to notice one of the most vital points in the whole matter, that was, how long perfect insulation could be maintained in long lines of submarine cables. It was a well known fact, that both gutta percha and india rubber were absorbents of water to the extent of 20 or 25 per cent., but in large conductors with considerable insulation, they would remain practically useful for some time, though afterwards they gave way; and therefore, with reference to the maintaining of these long deep sea cables without some better protection than had yet been given to them, he thought there was no chance of a successful result. The opinion of those who were best acquainted with the subject was that the question of insulation, as applied to long lines of submarine cables, was very far from having received a satisfactory solution. It was very well where they had large conductors and short working stations, but when they came to lines of between 2,000 and 3,000 miles, unless they protected the gutta-percha insulator with an impervious material, he believed it would be impossible to succeed with long lengths of submarine cables. With reference to the destructibility of cables from marine insects, it was a well known fact that they had a great antipathy to carbon. In preparing an outside covering he believed India-rubber, mixed with large quantities of carbon, was the most practical and economical preservative, and the strands of wire might be firmly embedded in that material. He thought that as an insulator, collodion was well worth a trial, and he would suggest that an experiment with wire of No. 16 gauge, covered in one case with gutta-percha and in another with india-rubber, and in a third with collodion, should be laid; he believed the result would be found to be that, under a pressure of two or three tons, both the gutta-percha and the india-rubber would lose their insulation, whilst the collodion would remain as compact as a piece of glass.

Mr. CROMWELL VARLEY said at the late hour to which the proceedings had extended, he could not touch upon many of the topics which had been introduced in this paper. With regard to the influence of the aurora borealis upon the telegraph wires, he would state that in the distance from London to Ipswich, only 70 miles, he had found the tension produced by the influence of the aurora equal to 150 cells of a Daniell's battery, and this phenomenon affected submarine cables and air wires alike. These currents passed through the surface of the earth itself; and it had been observed by the Astronomer Royal that, about three days after any atmospheric disturbance of that kind took place, there was a change in the weather, and those observations were forwarded to Admiral Fitzroy, to assist him in his forecasts of coming storms. The next point he would allude to was that the specimen of cable before them was not that which was proposed for the main length of the new Atlantic line. It was a specimen of the shore ends only. It was obvious that no ship in existence would be able to carry such a length of cable of that size as would be required to reach from Ireland to Newfoundland. With regard to the action of marine insects, it was noticed in the Mediterranean, on the line from Toulon to Algiers, when an accident occurred to a cable (which was covered with steel wires, each of the wires being covered with tarred hemp, and the parts were picked up at 1,600 fathoms) that the marine animals had eaten the hempen yarn from the cable, but they had not touched the gutta percha. On the lines from Malta to Alexandria and from Sardinia to Corsica, which were in good working

order; although the insects had eaten into the hemp, they had not eaten into the gutta percha. With reference to the pitching of vessels in paying out a cable, it was right they should understand what took place in that operation. Of course they could not control the weather. Unless they were prepared to lay a cable in a gale of wind as well as in smooth water, it was useless to attempt the operation. In the laying of the Atlantic cable there was never a greater angle than 15 degrees to the horizon. The vessel pitched, but the strain upon the cable was not nearly so great as if it hung perpendicularly from the ship. The paying-out machinery was furnished with friction gear, and in any extreme strain the machinery yielded to it. The cable between England and Holland was laid last year in the same way, and he had no hesitation in asserting that there was not a single kink in the whole of that cable. He quite agreed in the desirability of further surveys being made across the Atlantic, not only as regarded the direct route, but also as to the northern route. The general result of the soundings up to the present time was that in no one instance had the lead brought up anything but the softest ooze. One gentleman had suggested that a cable to America should consist of several wires; but regard must be had to the amount of induction. As they lengthened the line they weakened the currents through the cable, but increased the inductive resistance, and the having more wires than one in the same cable still further increased this action, so that he thought it was practically impossible to work a cable with more than one wire from this country to America. He wished to state this fact, which ought to be borne in mind, that had it not been for Professor Thomson's elegant instrument, with 70 yards of wire upon it, the Atlantic cable would never have spoken at all. Reference had been made to a proposed telegraph without wires, a system introduced by Mr. Haworth. He should be glad if the chairman would favour the meeting with an explanation of that system, for he had been informed that Sir Fitzroy Kelly and the learned chairman were both strong believers in the success of the scheme. He (Mr. Varley) had tried the experiment on a very small scale in his own garden, with stations only eight yards apart, and although he employed a galvanometer of the most sensitive kind he could not get the slightest trace of a current.

Mr. THOS. WEBSTER, F.R.S., rose to suggest the propriety of the adjournment of this discussion till the following meeting. He remarked that a subject of this vast importance, involving so many questions of interest, could not be properly discussed in the brief time which remained after the reading of the paper. Although this subject had been discussed before several of the scientific societies, yet this Society, from its constitution, afforded the widest scope for doing so in a manner which its great interest and importance called for.

The CHAIRMAN said he was informed that arrangements had been already announced for future papers for several succeeding nights of the Society's meetings. Therefore all they could do would be to request the Council to fix upon as early an evening as possible for the renewal of this subject.

Mr. J. H. MURCHISON said, as one of the oldest members of the Society, he recollected occasions on which the discussion of subjects of less public importance than this had been adjourned to a future evening, and he would strongly support the suggestion of Mr. Webster that the same course should be adopted on the present occasion.

After a few further observations from Mr. WEBSTER,

The CHAIRMAN said he had no doubt arrangements would be made to afford an opportunity for a further discussion of this subject. With reference to what had fallen from Mr. Varley, he begged to say that he had seen no experiments whatever with the system of telegraphs without wires, and had never expressed any opinion upon it. He had given his advice with reference to legal matters, but had never expressed any opinion relative to the merits of the invention, one way or the other. He now begged to propose that the best thanks of the meeting be given to Mr. Masey for his paper.

The vote of thanks having been passed,

The secretary announced that on Wednesday evening next, the 4th February, a paper by Mr. Alexander Burrell, "On Cooking Depots for the Working Classes, recently established in Glasgow and Manchester," would be read.

The Secretary has received the following letter:—

SIR,—During the discussion last evening several speakers made allusion to hemp. It is worthy of note in these proceedings that the pressure of the sea at great depths destroys the fibre; and it will be found in Scoresby's remarks that whale lines which had been (some hours only) at bottom attached to harpoons in the whale were rendered useless; that wood of various densities, as well as cork, had all their air vessels disrupted, and would not float when they had undergone the pressure of 1,000 fathoms. It is well known that port wine, however well corked and covered with bladder and resin, is changed at 500 fathoms, and the bottle, with cork inverted, comes to the surface simply containing salt water. The pressure on the gutta percha of the cable would press home and expel all air; but unless again brought to the surface, no air could escape under the condensed condition of the gutta percha. We should therefore receive with caution all assertions as to the condition of cables recovered from great depths, the bringing to the surface having played the second part, as in condensing and exhausting.

Yours, &c.,
E. BELCHER.

In order to afford an opportunity for a further discussion on the Submarine Telegraph, a paper on this subject will be read by Mr. Thomas Webster, F.R.S., at the meeting on Wednesday evening, the 11th February. Captain Symonds, whose paper on "Twin Screw Steamers" was fixed for that evening, has kindly allowed its postponement to the 4th March.

ARTISTIC COPYRIGHT.

A meeting of Painters, Engravers, Publishers and other persons interested in the better protection of Artistic Copyrights, was held at the French Gallery, Pall Mall, on Wednesday evening last, convened by circular as follows:—

"French Gallery, 120, Pall Mall, 24th January, 1863.

"SIR,—You are invited to attend a meeting of Painters, Engravers, and other persons interested in the better protection of Artistic Copyrights, to be held at the French Gallery, 120, Pall Mall, on Wednesday, the 28th instant, at eight o'clock, p.m., to consult as to the best course to be adopted to obtain from Parliament an effective Act on the subject. (Signed)

"S. COUSINS, R.A.	T. LANDSEER.
D. COLNAGHI.	C. G. LEWIS.
GEORGE DOO, R.A.	D. MACLISE, R.A.
W. P. FRITH, R.A.	J. E. MILLAIS, A.R.A.
E. GAMBART.	J. H. ROBINSON.
F. GOODALL, A.R.A.	H. T. RYALL.
HENRY GRAVES.	W. H. SIMMONS.
HOLMAN HUNT.	C. STANFIELD, R.A."

The chair was taken by Sir THOMAS PHILLIPS, Chairman of the Council of the Society of Arts, and a Deputation from the Council attended,

consisting of Mr. J. G. Frith, Mr. Wm. Hawes, Mr. Thomas Sopwith, F.R.S., and Mr. Le Neve Foster, Secretary. The meeting was very fully attended by artists, engravers, and others.

The following resolutions were passed :—

Proposed by Mr. E. GAMBART, seconded by Mr. J. C. ROBINSON, A.R.A. :—

"The principle that artists are entitled to a copyright in their works having been now acknowledged by Parliament in numerous Acts, beginning with the reign of Geo. II., and ending with the Act of last session, it is expedient, in the interest of the public, as well as of artists, that the law should be made efficient for maintaining and securing all their rights."

Proposed by Mr. WM. HAWES, seconded by Mr. JOHN DILLON :—

"That engravers and publishers of engravings and prints are entitled to the protection given by the 25th and 26th Victoria to publishers of photographs."

Proposed by Mr. ERSKINE NICOL, R.S.A., seconded by Mr. THOMAS LANDSEER :—

"That in order to rescue the art of engraving from the destruction with which it is threatened by infringements of copyrights, it is indispensable that the offences of making, selling, exhibiting, or in any way dealing in piracies of whatever kind, be repressed by summary proceedings before any two Justices of the Peace."

Proposed by Mr. E. GAMBART, seconded by Mr. J. R. HERBERT, R.A. :—

"That England, having contracted with several countries, and especially with France, treaties for reciprocal protection of copyrights, under which English interests are perfectly safe in France, while French copyrights have no effective protection here, it is essential to the dignity and fair dealing of this country that so unjust a position should not be maintained."

Proposed by Mr. J. G. FRITH, seconded by Mr. J. P. KNIGHT, R.A.—

"While the necessity for summary procedure in England for all offences against the law of Artistic Copyright is immediate and pressing, a general consolidation of those laws, and the assimilation of the Art Copyright laws of the great countries of Europe is also desirable, and that this need ought to be represented by the Artists and Publishers of each nation to their respective governments, with the view to bringing about some common action among them."

Proposed by Mr. R. REDGRAVE, seconded by Mr. E. FIELD :—

"That the thanks of those interested in the fine arts are due to the Society of Arts for the labour and perseverance to which the Act of the last session of Parliament is mainly to be attributed, and that they be requested to continue their assistance till the law on these subjects is made efficient and clear. And we would especially thank their chairman, Sir Thomas Phillips, for attending and taking the chair on this occasion, and also the members of their deputation for their attendance and aid."

At the conclusion of the meeting, on the motion of Mr. HAWES, seconded by Mr. SOPWITH, a cordial vote of thanks was unanimously passed to Mr. Edwin Field for his valuable services in connection with the Artistic Copyright Act of last session.

AWARDS OF MERIT AT INTERNATIONAL EXHIBITIONS.

(*Continued from page* 174.)

In August last the Council of the Society of Arts issued a letter, inviting the opinion of the Jurors, the Commissioners for the Colonies and for Foreign countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and requesting replies to the questions given below, with the intention of embodying the answers in a public report.

AWARDS OF JURIES.

1.—Are you of opinion that Awards for Merit, by medals or otherwise, in International Exhibitions, are desirable?

2.—State the reasons for your opinion.

3.—Ought Works of Fine Art and Designs to be excluded from the awards?

4.—Can you suggest any better method than the appointment of jurors for making the awards?

5.—Can you suggest any improvement in the constitution or proceedings of the juries?

6.—Is any appeal from the decision of the juries desirable?

7.—If you think awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?

8.—Have you any further suggestions to offer on the subject?

The following is a summary of the replies received. The figures attached to the replies correspond with those of the questions :—

E. B. ROBERTS, Juror, Secretary, and Exhibitor, Class XXVA.—1. Yes. 2. Were it not for the incentive of reward, not one-fourth of this year's contributors would have responded. The criticism of competent and impartial judges at Exhibitions assists in bringing forward inventions which without it would not be known. Exhibitions create that spirit of competition and rivalry so necessary to excellence. Many leading manufacturers no doubt decline to enter the field, on the plea that awards are unjustly made, but that can form no valid objection to the principle. As the exhibitors were, to a certain extent, selected in the allotment of space for exhibition, it is not a matter of surprise that a large portion is entitled to distinction, but one grade of medal only creates a difficulty. From experience as juror, thinks there should be two grades of medals and an honourable mention. 3. Fine arts and designs should not be excluded. 4. No. 5. Suggests there should not be less than three English jurors in any class, each possessing a practical knowledge of the production of the articles from the raw material, with one foreign similarly qualified juror from each nation largely contributing. 6. Juries having been selected from persons eminent for special knowledge, their judgment should be final. The possibility of appeal would tend to relieve them of the responsibility. Suggests, if an exhibitor be dissatisfied with the judgment, he should have the option of withdrawing his goods from competition before the commencement of the labours of the jury. Once submitted, the decision of the jury should be final. 8. In Exhibitions, which are not bazaars for the sale of property, but for the attainment of excellence in design and workmanship, no person should be accepted as a contributor who is not the manufacturer.

JOHN ROBERTS, Exhibitor, Class XXXV.—1. Yes, unquestionably, awards for merit, but not with medals. 2. Stimulus to manufacturers to excel in the production of

superior articles. 3. No; should be encouraged by every fair means. 4. No, provided they be properly selected and conversant with the articles, and not exhibitors of the same. 5. No; unless it be as stated in answer No. 4. 6. Yes; where exhibitors are dissatisfied, they should be heard in defence to explain. 7. A certificate from the jurors, assigning why the same was given, would be preferable to medals. 8. None but *bonâ fide* inventors or manufacturers should have certificates. The same to be classed for fine arts, designs, improvements in machinery, articles of utility, philosophical instruments, ornaments, &c., &c.

AUGUSTE ROGUES, Chef de Service, Secrétariat de la Commission Impériale Française.—Le principe des récompenses tient au principe même qui préside à l'organisation d'une exposition. Les récompenses seraient inutiles, et présenteraient même une contradiction choquante dans une Exposition dont un pur intérêt mercantile formerait le fondement. Il n'y aurait plus évidemment à s'occuper de récompenses si, comme on le donne à entendre dans le rapport Anglais de l'Exposition de 1851, les Expositions universelles devaient, dans un avenir rapproché, se transformer en bazars universels. Il est vrai de dire que ce système ne paraît pas avoir fait jusqu'ici son chemin dans le monde; espérons qu'il restera dans le domaine des paradoxes. Les Expositions perdraient en grande partie leur intérêt général et leur action civilisatrice le jour où elles n'auraient pour but et pour stimulant que des avantages commerciaux immédiats. Personne ne l'ignore, les maisons de troisième ou quatrième ordre trouvent seules quelque utilité réelle à figurer aux Expositions; les grands fabricants n'ont rien à en espérer sous ce rapport. Leur production suffit souvent à peine à leur clientèle, leur réputation peut difficilement s'accroître; s'ils exposent, c'est pour contribuer au succès de leur pays respectif; et, pour assurer ce succès, ils ne reculent devant aucun sacrifice de temps ni d'argent. Il est utile d'encourager ces dévouements, et il est juste de les reconnaître. C'est le point de vue d'où les peuples, les souverains et les bons esprits doivent se placer pour juger les questions des récompenses. La France, forte d'une longue expérience, a depuis long-temps adopté, pour les Expositions nationales et universelles, le système des récompenses, et elle l'applique largement sans reculer devant aucune de ses conséquences. Elle veut que tous les genres et tous les degrés de mérite soient distingués, aussi bien dans les arts que dans les sciences et l'industrie. Ce qu'elle faisait pour ses Expositions nationales, elle l'a fait pour son Exposition universelle. Elle a traité les étrangers comme s'ils étaient de la famille; et loin de chercher des économies sur la valeur des récompenses, elle a créé une médaille d'or de plus en 1855. Aux Expositions nationales, les récompenses consistaient—sans parler de l'Ordre de la Légion-d'Honneur—en trois médailles, médaille d'or, médaille d'argent, médaille de bronze, et en une mention honorable. En 1855—sans parler également de l'Ordre de la Légion-d'Honneur, accordé à un grand nombre de fabricants étrangers—il y a eu quatre médailles: une grande médaille d'or, une petite médaille d'or, une médaille d'argent, et une médaille de bronze, plus une mention honorable. Il n'est pas d'efforts, de talents, de mérites que l'on ne puisse, avec ce système, spécifier et récompenser. Il est le mode de mesure des opérations des jurys des Expositions. Si l'on voulait peser les critiques, on les trouverait bien légères. Il y a sans doute des améliorations à introduire dans la façon d'opérer du jury; la Commission Royale de 1862 a fait un grand pas dans cette voie en renfermant les opérations dans les deux premiers mois qui suivirent l'ouverture, et en proclamant les récompenses au commencement environ du troisième mois. Il conviendrait, je crois, de permettre aux exposants de faire appel des décisions du jury. Les présidents, réunis en conseil, ne font que reproduire les raisons et les faits qui ont déterminé les membres de leur jury spécial; un grand nombre d'entre eux, fatigués de leurs travaux précédents, n'assisteraient pas au conseil. Il vaudrait mieux que les appels fussent jugés administrativement par la Commission même de l'Exposition. Elle se ferait assister d'hommes spéciaux; elle aurait, plus que tous autres, de grandes facilités, avec ses nombreux agents et son autorité spéciale, pour obtenir les renseignements nécessaires, surtout lorsque les appels proviendraient d'exposants étrangers. Je terminerai par une dernière considération. Il est d'usage de placer, comme présidents dans les jurys, des hommes éminents revêtus de hautes fonctions, dont le temps est si précieux qu'on les voit à peine paraître à leurs réunions. Il serait mieux de ne composer le jury que de personnes ayant non-seulement la volonté, mais la possibilité d'accomplir très-fidèlement leurs mandats.

THE MARQUIS OF SALISBURY, Chairman of Jury, Class X.—1. Yes. 2. If no opinion of the merit of any invention or improvement is expressed from authority, the Exhibition ceases to be anything but a bazaar on an extensive scale. 5. None. Is of opinion that a better classification of the objects exhibited is wanted. 6. Decidedly of opinion that lists of the objects rewarded in the Exhibition of each nation should be appended in large characters to the department occupied by that nation. This would attract the public to the inspection of what is most worth looking at, promote rivalry, especially if the word "best" could be put to those articles which excelled those of other nations, and the public notice would prevent fraud in claiming prizes hereafter.

A. SALOMONS, Chairman of Jury, Class XXXIII.—1. Yes; awards very desirable, and medals the most effectual mode of marking such awards; honourable mentions good to mark where merit, although considerable, is not of sufficient importance for a medal. 2. Stimulates exhibitors; induces inventors to excel and improve. Of great value to producers of good articles of new invention, especially in the case of young beginners. 3. Works of Fine Art should not be excluded. Designs are essential to manufacturers, and designers should be stimulated. 4. Nothing better than a properly constituted jury. 5. Men of undoubted character and position in the special trade should mainly constitute the juries of that class, and a sufficient number should be on each, so that party feeling would be overruled by a majority. The appointment of jurors should be made of those who have been and are the most renowned in each trade. Persons who have retired from active co-operation in the business should be associated with those who are still actively engaged in it, so that the improvements of the present time may not be overlooked. 6. Yes; oversights and mistakes always likely to occur. A jury composed of the chairmen of all the juries would be the best to decide such appeals, and the jury whose judgment is appealed against should be invited to amend. 7. Considers awards desirable. 8. (*a*) That more definite and specific rules should be laid down for the information of exhibitors—for the guidance of committees, as to who should be allowed to exhibit—and for the direction of the juries in giving their awards. For want of this, much of the dissatisfaction in respect to the present exhibition has arisen. (*b*) In some classes, for instance, in the present exhibition, retailers have been excluded by metropolitan committees, and retailers of similar goods have been allowed to exhibit by provincial committees; either all should be admitted or none. (*c*) It should be better defined, as to whom medals or honourable mentions should be awarded. Uniformity in the awards of the various juries is most important. In the present exhibition are found some juries awarding prizes to mere collections of articles, and other juries refusing them to even more meritorious collectors, from their having laid down a rule not to give awards to any but manufacturers. (*d*) Unfair to give prizes to mere purchasers of objects, purchased for the express purpose of exhibition, and in the manufacture of which the exhibitor in many cases has not taken any part. (*e*) In the present exhibition the awards have also been made to retailers in a very unsatisfactory manner. (*f*) Suggests that none

but absolute manufacturers (those only who employ workmen and pay them wages), should receive medals, and that producers exhibiting works designed by them, or collections collected by them, should receive honourable mentions only, where considered sufficiently meritorious. (*g*) Is aware that the word "manufacture" admits of widely different constructions, and therefore requires some special regulation to be laid down. For instance, in the production of a piece of printed muslin; one man gives the design to another man to draw, then to another man to engrave, and again to another man to print on the cloth manufactured by another manufacturer; who, is in such case to be considered the real manufacturer? or who is to be entitled to the medal if the production is worthy of it? The producer or director of the whole should be rewarded in some way, and this has been refused by the jurors in several classes, showing strongly the great necessity for more unity of action. (*h*) Jurors should be rewarded by a medal, or by some particular mark of merit which would show that they had attained such a position in their trade as to be selected judges of the works of others. This necessary, because jurors cannot receive medals for any manufactures of their own which may be exhibited, and this places their goods at a disadvantage in the eyes of the public compared with the productions of other manufacturers to whom medals are awarded.

Sansom Dufaville and Co.—1. No. 2. Because of the many glaring and grievous errors in most Exhibitions, this in particular, where interest, display, or puffing names have been rewarded, respectability and real merit simply mentioned, and in many instances entirely unnoticed. 3. Yes; because they are in most instances valuable or otherwise, according to various tastes, subject to the difficulty, and to errors, &c., mentioned in answer No. 2. 4. If awards should be considered desirable in future Exhibitions, trusts that some better, if possible, method will be devised in selecting the jurors. Here is the evil, but at a loss to suggest a remedy. Impossible for any jury, however impartial, to do justice in all cases. 5. The names of the owners of articles exhibited should be, if possible, kept from the jurors until after the awards are made. 6. Yes, most desirable, and a searching investigation made; exhibitors called and questioned on oath if necessary. 7. Exhibitors would come freely and show their productions in the best style possible, and trust the public for awards, whom they know to be the best judges. 8. No.

R. Angus Smith, Ph.D., F.R.S, F.C.S., Juror, Class Xb.—1. Yes; at least nothing that happened does in the least speak against the system of awards, but sees no necessity for medals. An opinion clearly expressed is the greatest reward or condemnation—of the greatest value to the inventor, when favourable, and the greatest gift to the public, whether the opinion be favourable or unfavourable to an invention. 2. (*a*) Because opinions are very much desired by inventors and by manufacturers generally. When favourable, an opinion is a reward; when unfavourable, a lesson. (*b*) Because they are needed as well as desired by a class of men who can give no proof to the world, on a sufficiently large scale, of the value of their work. (*c*) Because the world is in actual want of an opinion on inventions brought before it, they being put to great expense in trying schemes of which a special knowledge would quickly show the folly. Opinions formed by skilled men would preserve them from many gross deceptions. The public, no doubt, frequently teaches the skilled man, and forces new truths upon him, but this we cannot expect to be constantly the case; besides, although an uneducated man may teach an educated man some things, we do not for that reason diminish our desire or respect for education. 3. Does not feel sure that we are fit to give just opinions on matters of taste just now, as there is little unity of feeling in these matters, but, abstractly, there is no fitter subject for awards than that which we observe in fine arts and designs, and history encourages the practice. Therefore, it would be well to include them, and take the risk of unpleasantness caused by real or fancied mistakes of a jury. Improvement would come. 4. The appointment of jurors for giving awards of of any kind seems to me the only possible mode. It would be absurd to leave the work to one man, and impossible for one man to do it, and if more be added, a jury is in reality formed, no matter what name be given to it. 5. The constitution of the juries of the Exhibition of 1862 was on very correct principles. The mode of proceeding was not so correct. From the very nature of the proceeding an award in one jury had a different meaning from an award in another. The rules defining their duties were not sufficiently precise. There were, in reality, no very definite rules on the main points, and the main difficulties of organising the proceedings in each jury were overcome in a different manner by each body of men. A code of laws was, in fact, made by each jury. For example, in some juries it was considered right to give a certain proportion of medals to certain nations, whether the work done were good or bad; others considered it right to give to manufacturers of long standing, who were going in the most ordinary jog-trot, lest the want of a medal should throw them back, but refused to a new and promising idea, because it had not stood the test of time and experience. Of what value is a jury if it must wait to be taught by the time and experience of the public? The jury is intended to be time and experience together. Medals such as were awarded this year express little. There were only two ideas expressed in the rewards—one of moderate, the other of higher proficiency. The medals used did, however, express as many ideas as the jury wished to convey, and are consequently of a proportionate value. The lamentable scarceness of ideas in the rewards (viz., medals and honourable mentions) given made little difference between the best and the worst, so that medals and mentions were in many cases the causes of great injustice. It seemed that the awards of the juries ought to have passed through a second tribunal, as the first was too small to be entirely free from prejudice in all instances. This was expected to be done by the Council of Chairmen. On doing so each jury ought to have been present to explain its own acts and all responsibilities undertaken openly. 6. Decidedly there ought to be a committee for appeals. Arbitrary forms are always to be avoided, and a decision without an appeal is a petty despotism which leads to a great deal of unreasoning presumption. It is a sure mode of fostering corruption, and the idea is in every way unworthy of a country and age in which talent and information are so abundantly found. The appeals would in most cases be rapidly disposed of, and much injustice prevented. 7. The answer is already given. The true mode of bringing inventions before the public is by opinions carefully made and well published. Here as elsewhere it is the amount of mind used in the award which gives it its value. But in addition to this, I think it would be well to reward by a distinct sum of money individuals who make valuable inventions which cannot bring a mercantile reward. This principle is already recognised by the Government, but it is incompletely carried out, and a mode of doing it would require a separate treatise. The sum spent on a few thousand useless medals would make a few substantial prizes. 8. The opinion of many experts meeting without any opposing interests is, in my opinion, so valuable, that many law suits would be saved by them, and many poor men preserved from the ruin caused by the crushing power of capital on invention. At present witnesses are frequently brought together in great numbers to prove or disprove things well known, many very inferior men making assertions which a few well informed could easily set right. Hopes to see a body of men able to give its opinion on inventions, and the time may come when such a body will be the most important in the whole kingdom. Even now a volunteer body could be formed to act for a

great many purposes. Will not draw out the subject further, but wait to see if any attention is to be paid to proposals made.

THOMAS SOPWITH, F.R.S., Juror, Class I.—1. Yes. 2. Has observed through life that prizes of any kind given for merit have a very strong tendency to increase exertion. Medals, or distinctive honourable awards, are usually valued more than money prizes of like value. Such awards are useful marks of excellence which the public can readily recognise, and the hope of obtaining such rewards is a strong motive with many for sending articles to be exhibited. 3. No. 4. The careful selection ef well-informed persons as a jury appears to be the most suitable means for arriving at a correct decision as regards comparative merit. 5. It should be imperative on all persons undertaking the office of juror to attend day by day regularly to a careful and systematic inspection of all the articles exhibited in their respective classes; that such attendance be recorded, and that all exhibitors should have an opportunity of personally waiting on the jury, and of inserting in properly tabulated forms such information as the jury might deem requisite. 6. As some cases of inaccuracy, or even of serious hardship, may, through inadvertency or erroneous information, arise, opportunity of appeal should exist. But such a power, unless strictly regulated, might be unsatisfactory. A committee of three, to be called a tribunal of appeal, might be appointed to decide whether reasonable cause of appeal exists, and thereupon, if needful, to take evidence, and confirm, alter, or disallow the award. No such decision to be come to until after a printed statement of the evidence and reasoning for such decision had been submitted to the jurors making such award, and until their observations on a reply to such statement had been considered by the committee or tribunal of appeal. 8. A great quantity of information might be obtained by means of printed forms to be filled in by each exhibitor, the arrangement of such form being adapted to the several classes for objects exhibited. Also the usefulness of the International Exhibition would be greatly increased if clearly printed explanations in detail were affixed to each article exhibited.

Dr. Von STEINBEIS, Director of the Royal Central Board of Industry and Commerce, Stuttgart; Chairman of Jury, Class XXXIB. — 1. In order to consider the question whether awards, which have hitherto been given at International Exhibitions, do really answer the purpose intended, it is first of all necessary that we should have a clear understanding of what is the aim of such awards. But neither in the questions of the Society of Arts, nor in the Jury Directory of 1851, nor in that of 1862, is it clearly stated what that aim really is. We read of awards to be given by the juries of International Exhibitions, and we are apprised of the mode of proceeding to be followed, and of the principal points to be kept in view on such an occasion, but nowhere do we find it stated what the final object to be attained by the distribution of awards should be. Even the motto we read on the juror's medal of 1851, "Pulcher et ille labor palmâ decorare laborem," only refers to the business of the juries, without explaining the design of that business. According to the proceedings in 1851, it might be thought that the distributing of prizes was merely to reward exhibitors for their participation in the Exhibition, that is, each one according to the smaller or larger share he had taken in it, some with one medal, others the other; indeed, it so happened that at that time all exhibitors finally got medals, for to those who had not obtained any medals of merit from the juries, "Exhibitors' Medals" were forwarded by her Majesty's Commissioners afterwards. On the present occasion, in 1862, we can scarcely presume that the same object exists, it being notified that amongst seven exhibitors only two are to be selected for medals. But at the same time the Jury Directory recommended that medals should be given to such as would be likely to fulfil one or some of the following conditions or qualifications:—"Novel mode of workmanship, skill and excellence in known methods of workmanship, excellence in the quality obtained combined with utility, instructiveness of any series exhibited, durability, economy in the production, cheapness, economy in maintenance, saving in time and the quantity produced (in the case of machines and implement), application of a new material, good taste, solidity, improvement, new application of known principles, application of new principles, exactness in workmanship, simplicity, perfection, utility, adaptability, increased production, regular productions," &c.; and as there is scarcely any product or fabric to which the one or the other, or even several, of these conditions will not apply, it follows that nearly every exhibitor ought to have a medal; and it is therefore not surprising that dissatisfaction should be caused by the last distribution of prizes. If the aim of the distribution of prizes consists in the rewarding the exhibitors, either for their participation in the exhibition, or for all the qualifications named above, it is clear that the procedure of 1851, where three kinds of medals were given, and each exhibitor got a medal, was preferable to that of 1862 where but one kind of medal was awarded, and the number restricted to one-third the exhibitors. 2. In support of the foregoing opinion, no further evidence will be required; it will, however, lead us to the question:—Whether the rewarding of the mere participation in an International Exhibition would be really a task worthy of such a great enterprise, or of such a body as an international jury? The design of the noble promoters of the International Exhibitions of 1851 and 1862 goes something further than this. They certainly intended to reward merit, which had higher claims than the mere participation in the Exhibition, and also they surely did not mean to give awards for performances which are part of the duties and business of every man who manufactures goods for sale. It would be difficult to find sufficient reason for honouring a manufacturer with a public reward on the ground of his largely supplying the markets with good articles, and of his pursuing successfully his own interests. For these, his sole efforts, he will be rewarded, if they are to the purpose, by his customers. Still it may be said, that by giving to a manufacturer a medal as a reward for his having exhibited a good article, the public is shown the sources where to obtain the good article it wants, and that therefore such an act would benefit the whole community, whilst it would at the same time give support to an active and respectable beginner against large and monopolising firms commanding the markets. But the exhibiting of superior goods of itself gives no guarantee for a regularly good manufacture and supply; the jury cannot even have positive certainty whether the exhibitor has himself manufactured the goods exhibited. It would therefore be quite contrary to the purpose, if we contemplate making the public dispense with its own judgment, which is ready to support the small manufacturer if he produces a cheaper or a better article than others who have hitherto commanded the market, or if, on an increasing demand, he appears on the market at the right time with goods fit to compete in quality and price. General opinion, however, declares that public rewards are in their place in those cases where extraordinary efforts benefiting the whole community have been made. To acknowledge these is as much a demand of gratitude as it is one of prudence. The latter compels us to bring such efforts before the public in order to stimulate others to equal performances, and to set the prospect of an award before those to whom the acknowledgement of their fellow-citizens is of higher value than pecuniary gain, or who have made sacrifices or obtained results, such as cannot be compensated with money. To serve as mediums of public gratitude—as means for the encouraging of progress and stimulating efforts devoted directly to the common wellfare—these are the glorious aims worthy to be inscribed on the statutes of International Exhibitions. But here the greatest precaution is necessary, because the

whole value of rewards given, and thus the very attainment of the aim in question, must depend upon their being given on just grounds, the more so, as they have not for themselves that splendour which is the usual accompaniment of the distinctions which the State bestows, though these are not always given on distinct grounds. On the careful following out these objects depends, too, the only possibility of continuing the holding of International Exhibitions. It is only by strictly admitting in future such articles only as represent real merit—be they inventions or any other works not within the sphere of the every-day work of factories—that the character of the bazaar, as well as the gigantic increase of these exhibitions in extent to which they are tending, so as to render them impossible on economical grounds, can be obviated. 3. If juries, without respect to the quality of the objects which an exhibitor is exhibiting, will only reward such performances as promote art and industry in general, the writer sees no grounds why products of the fine arts should be shut out from the competition. It is difficult to perceive why, for instance, Mr. J. N. Von Fuchs should not have been honoured with a medal for stereochromic wall-paintings, or any other patriotic man, who, after having founded, with considerable sacrifices, a school of art, exhibits some works of that school. The number of such medals would be small indeed, but they would have all the greater value. 4. Cannot propose any kind of juries better adapted to the purpose than those formed in imitation of the juries of the public courts, but it would be necessary that the juries for the awarding of prizes should not content themselves with bearing the name of juries, on the contrary, they should imitate them in their whole organisation and mode of proceeding. Up to the present time juries of international exhibitions have uot done justice to their name. They were assemblies of experts, or of commissioners influenced by directions from higher quarters, but not real juries; their deliberations were rather conducted in the way of conversations than of judicial proceedings, and the awards decided upon were more the result of mutual agreement than of regular resolutions, or decisions which would bear the criticisms of the public. 5. Gives the following rules to be observed:—*a.* Only such objects should be admitted to the exhibition, as the exhibitor will certify in writing that he believes represent progress made in certain manufactures within the last ten years. This progress he must clearly define, or point out the excellence relating to art or industry. The document must be attested by the exhibition committee of the place to which the exhibitor belongs. *b.* Applications for space not sent in at least three months before the opening should be refused. Objects, of which no notice has been given, should on no grounds be admitted, except any important discovery, or invention made after the time. Objects not delivered within the time appointed should be refused. *c.* As soon as the time for the applications is over, the objects should be classified, and lists of the goods sent in with the declarations should be published when the time for sending in is past. For their insertion the exhibitor must pay. *d.* The catalogues so compiled should be sold, each class separate, and each exhibitor should have a copy gratis. *e.* Works of recognised merit should have bronze medals:—1. A medal for general merit in relation to art and industry medal for general merit). 2. A medal for the progress made in the manufacture of products of art and industry (medal for progress). 3. Honourable mention upon any praiseworthy efforts in any direction, which have not yet been sufficiently established, or which have not yet attained important results. The designation of "general merit" is bestowed upon every work relating to industry, not bearing the stamp of ordinary efforts for gain's sake, but being of advantage to society at large, or having been proved to exercise a decidedly beneficial influence on the common welfare. As "progress" is to be declared, every improvement of a manufacture, of a tool, of a machine, apparatus, or process for manufacturing, or domestic purposes, be it patented or not, published or not. 6. In order to prepare for, and to assist the labours of the jury, the exhibition commission should appoint a jury commissioner with as many thoroughly experienced jury secretaries, as there are classes of goods. These should be functionaries of the exhibition commission, to be engaged and paid for the whole time the jury is in action. The jury-commissioner in concert with the class-secretaries should direct the arranging of the objects to be exhibited, and the allotting of them to the different classes, receive the letters coming in, forward them to the juries and the reporters concerned, and take charge of the regular transaction of the business of the juries. The jury-secretaries, as soon as the arranging of the objects is to be proceeded with, should forthwith examine each the objects of their classes, so far as this can be done by way of inspection, with all possible speed, and they should record their opinion about them with reference to the published catalogue. These records are subject to the revision of the jury-commissioner, and must contain short statements as to whether, and on what grounds, the exhibitor would deserve the one or the other of the medals, or an honourable mention or not. They must be ready four weeks after the opening of the exhibition at the latest, when they are forthwith to be published as a work of the jury-commission, and delivered for sale. Each exhibitor should receive a copy, and be invited to address to the commission any well-founded appeals. 7. The international jury is to be called together in the usual way, care being taken so that the number of the jurors selected from different countries be not in too great proportion to the number of their exhibitors, and the chairman and deputy chairman should be appointed by the Exhibition Commission as hitherto the case. The number of exhibitors to be allotted to a juror should, in the case of machines, tools, and apparatus, not exceed the number of 50; in the case of other goods, not that of 100, and the number of jurors to be appointed should be in accordance with this rule. Every person accepting the office of chairman, deputy-chairman, or juror, should send in a written document, attested by the competent authority of the country he belongs to, in which he engages to comply with the rules of business for the jury. Every juror should engage to make a report for his jury on certain kinds of articles of his class, for which he is chosen at the selection of the jurors. In this report he should treat of each exhibitor separately, and express strictly his own opinions. For the same purpose, and with the same duties, a proxy may be provided for each juror. Each juror should receive as soon as printed a copy of the published record, compiled by the jury secretary, on the objects of his class, in order that he may study the objects at proper times, and without overhurrying himself, paying regard at the same time to appeals sent in. At the end of two months he should hand his report to the Jury-Commissioner, who will require the president of the jury in each case to call upon his jury to begin its deliberations. The jury to be at liberty to adjourn its deliberations for a further two weeks in order that each juror may have the opportunity of examining the object, in case he has not done so already. Then regular meetings are to be held, in which the merits of each exhibitor and the award to be given are discussed, on the basis of written motions brought forward, with the necessary evidence by the secretary, and revised and remarked upon by the reporting juror. In these meetings, also, appeals sent in should be taken into consideration, and it would be a rule that the reporting juror should have the last word, and the decisions carried by the majority of votes, whilst in the case of equality, the president has a casting vote. The secretary to have the duty of preparing a concise record of the resolutions, to be signed by himself and by the reporting juror, which, after having been attested by the president, will be handed by the latter to the jury-commissioner. These records should be published. According to these records the lists of awards would have to be compiled and published, and the awards distributed.

In support of these rules the writer offers the following remarks:—By admitting to the exhibition only works of real excellence, there will be gained, as already stated, this great advantage, viz., that the exhibitions would be rendered less expensive, but all the more interesting. Should it be feared, however, that there might be a want of objects for decoration, nothing would prevent the Exhibition Commission allotting to each division, that is to say, to each country or province, a certain amount of additional space for such objects, which would, however, not have any claims upon the examination of the jury, and should be described in a special division of the catalogue. The fact that the document which each exhibitor is to send in must be attested by the Local Committee, would of itself prevent the exhibiting of unqualified products. The insisting upon the strict observance of the time of delivery would ensure a speedy delivery, a matter of the utmost consequence for the timely and regular transaction of the business of the jury. The publishing of the applications would have a double advantage. In the first place, it would be the means of providing the visitors with a very interesting exhibition-catalogue, which, being much more to the purpose would attract a greater number of visitors than the one hitherto in use, without, however, excluding eventually the publishing such a one. In the second place it would bring everything before the public, and under the criticism of the competitors, and thus prevent or punish every kind of manifest humbug. The obligation of the exhibitor to pay for his insertions would guard against any abuse. The making a distinction between "general merits for industry" and "progress," has been borrowed from 1851. By this means occasion would be afforded for the pointing out any sacrifices made for the general welfare over efforts having mere self-interest for their motive. By it besides, a certain gradation is given, exciting a contest for the reaching of the higher degree. The drawing these lines of demarcation presents no difficulty. The appointing of a Jury Commissioner for the whole of the juries, and of a Secretary for each jury, is not a new provision; it contains, however, the new feature, that the commissioner appoints to each secretary the exhibitors to be under his charge, whereby the passing over of the one or the other of the exhibitors, which did so frequently happen, will be guarded against. Another and very important new regulation is the obligation of the secretaries to lay before the assembled juries records minutely describing and reviewing a whole class. By these preparatory works the business would be brought to assume, as it were, the order and regularity of the judicial proceedings of a public court; and by the publishing and forwarding of these records to the exhibitors, any partiality would be obviated, whilst at the same time any exhibitors who may think they have been treated unfairly, would have an opportunity of collecting evidence to bear upon their own interests. For the facilitating and despatching of the labours of the juries, another effective means would be found in the circumstance that the jury-secretaries can begin with the preparing of their records during the unpacking of the goods, so that they may have them finished for the most part on the day of the opening of the exhibition. Moreover, if it be arranged that each exhibitor gives notice to the jury-secretary of his beginning to unpack, the latter will have a very good opportunity for a minute examination of the objects, and for the collecting information from the exhibitor, or his agent; whilst those of the exhibitors, who are desirous of personally giving explanations, would save time and money. The appointment of a deputy chairman by the exhibition-commission recommends itself by the consideration that it is of great importance to find thoroughly qualified persons for directing the labours of the jury, as well as to provide the jurors, who are for the most part professional men, with assistants of good general education, for which reason their appointment should not be left to the chance of an election. Nor can it be recommended that the president of the jury should act at the same time as reporter, for he should guide the deliberations in an independent manner. The defining the number of jurors according to the number of exhibitors is necessary in order to insure the timely despatch of the labours of the juries; and the same is to be said of the providing for a proxy, if any of the functionaries should be absent. All the members of the juries joining in the duties of reporting, would render this duty easier for any single member, preventing at the same time any persons from joining the jury who have no knowledge, or not sufficient knowledge, or who do not like to work. This provision, therefore, offers an essential guarantee for a fair judgment, and by procuring, as it were, for each exhibitor an advocate, it, at the same time, gives to these juries an organisation similar to that of the public courts. The juries, acting on the written documents and the subsequent examinations and explanations, would thus come to decisions which can scarcely be far wrong, seeing that not only the parties concerned, but also the public at large, have had an opportunity for pronouncing their opinions, a condition by which the publicity of a real judicial proceeding is realised as far as possible. The final resolutions, too, would be more speedily arrived at, inasmuch as it may be assumed that the secretary will agree in most cases with the reporter, but if not, then the decision of the united jury will be all the more required. By the publication of the minutes, the whole of the proceedings of the juries would be finally brought to the test of publicity, and as the reasons of the reporters are to be recorded side by side with the resolutions, the responsibility of the latter, as well as that of the president and of the whole jury, would afford to the public a sufficient guarantee for the justness of the decisions, such as hitherto never has been given. The particulars put together, as a whole, would form a historical work, affording instruction to the manufacturer and merchant, as well as to the technologist, the political economist, and the politician; it would take down to posterity the essence of International Exhibitions, and render a service to history which cannot be too highly appreciated. The only objection which may perhaps be made against this proposal will be the difficulty of obtaining men thoroughly qualified for the task in question without the spending of considerable sums of money. But this ought not to be a serious objection in the case of an International Exhibition, which would certainly always pay its expenses if kept within the limits defined in the foregoing remarks. No doubt there must be then no highly decorative and very expensive buildings. On the contrary, the beauty of the Exhibition would have to be sought in the tasteful arrangement and building up of the objects to be exhibited, rather than in architectural constructions and ornamentations which are apt to seduce the eye of the visitor, and to turn it away from the articles exhibited, instead of giving it relief. 6. With arrangements such as have been proposed in the foregoing, a Court of Appeal would seem to me perfectly surperfluous, and equally so the Council of Chairmen hitherto in existence, which, indeed, was only intended to interfere with the decisions of the juries, which were, at any rate, far more to the point than those of the Council, and thus to deprive the juries of one of their most essential qualifications, namely, of the final validity of their decisions. 7. It has been proposed by some, that instead of awarding prizes, the whole matter might simply be given over to the opinion of the public, or the press, or, if jurors should be appointed at all, that their whole business should be confined to their preparing a report. But neither the exhibitors nor the public would be benefited by either of these propositions. The public, which generally has not sufficient leisure to examine the Exhibition article by article will no doubt be desirous to be assisted in its judgment. A fair impartial judgment of the press is not always to be looked for, and if, after all, a jury has to pronounce its opinion, there are no just grounds why that opinion should not find summary expression in the award of

medals, which, as experience has shown, will really be of great advantage to many exhibitors. 8. Such are in a few outlines the views the writer brings forward in answer to the questions put by the Society of Arts. They are by no means the result of mere abstract reasoning, but rather of a long and ample experience, and they have been verified for the most part by practice. Having had the honour of being charged, at the International Exhibition of 1851, with the duties of a juror and reporter for the "Zollverein," in Class XXII (hardware); in 1854, at the (German-Austrian) General Exhibition, in Munich, with those of chairman and reporter for class X (furniture, fancy-ware, and domestic implements); in 1855, with those of chairman, for class XVI (hardware), and reporter for the "Zollverein," and lastly, in 1862, with those of chairman for class XXXI, and on all these occasions with the additional duties of an exhibition commissioner for the government of Württemburg, the writer has had opportunities of collecting ample experience on the question of the award of prizes. As president of a board, which has amongst its duties the encouragement of the industry of the country by local exhibitions, the writer has promoted and directed in Württemburg a number of such exhibitions with and without awards, and, assisted by other experienced and competent men, has been enabled to bring to bear upon them the experience obtained from the Great Exhibitions of 1851, 1854, and 1855. But having convinced himself already on the occasion of the latter that the mode of proceeding adopted there was doing no good, he took pains to organise the distribution of prizes he had introduced, so as to remove the imperfections under which exhibitions had hitherto been suffering, and to make the latter, as well as the awards, what they really should be, a public exposition of the development of industry for the time being, and a recognition of the merits of those who had distinguished themselves. A small exhibition of the industrial products of Württemburg, held in 1858, and organised after the described system, was a perfect success, and as to the distribution of prizes, which then took place, the writer is prepared to guarantee that no undeserving work has been rewarded, and no real merit has been passed over. As regards the amount of time and labour employed, he states that there was rather less with the system recommended by him than with the old one, applied to an exhibition of equal magnitude.

(*To be continued.*)

Home Correspondence.

MR. ISBISTER'S PAPER ON A PROPOSED PENAL SETTLEMENT.

Sir,—The question referred to by Mr. Isbister in his paper read on Wednesday evening, the 21st inst., is one of such vast general importance, and, moreover, possesses such peculiar interest at the present moment, that I hope I may be excused for troubling you with a few lines upon it. I am not acquainted with the territory the suitability of which to the purpose of a penal settlement it was one of Mr. Isbister's objects to point out, and I will not touch upon those portions of the paper in which he gives so interesting and graphic a description of that apparently inhospitable region, but I will confine myself to the consideration of whether a return to the old system of transportation would (with some modifications) be really a measure likely to contribute in the first place to the peace and safety of society in general, and in the second place to the reformation, whenever practicable, of the criminal himself.

Regarding, as I do, the first consideration as the one which really ought to guide us in coming to a conclusion, I cannot but be impressed with the advantages which transportation appears to offer for this object. Although it is probably true that public opinion in the present day would revolt against any extension of the punishment of death, there are some who would venture to recommend even this—not so much on the preventive principle, which in former days led us to inflict it for such crimes as horse-stealing and forgery, these being supposed to be very easily committed, and therefore to require that specially severe penalties should be attached to them—but with the simple view of ridding society of those of its members who had proved by their crimes that they were dangerous to it, and who had also entirely forfeited all right to its protection. With the advocates of this view, however, I cannot agree, for many reasons, which it would occupy too much of your space to enter into, and my only object in referring to it is that I cordially agree with the remark made by Sir Thomas Phillips at the conclusion of the meeting, that if secondary punishments cannot be rendered really effectual, it is much to be feared that a reaction will take place in the public mind, and that a feeling in favour of returning to some of the severities of our old criminal code will arise.

If, then, the punishment of death is excluded from consideration, what substitute appears to fulfil most nearly the conditions just referred to? If the criminal cannot be deprived of his life, and thus sent out of the world, the next best plan seems to be to send him far away from those whom his crimes might injure, and to force him to herd only with criminals like himself. The carrying this out with every gradation of severity seems possible only in the system of transportation. It may perhaps be just as important that society should be protected from the systematic swindler and forger as from the murderer and garotter, but it would surely be unjust and impolitic to expose them to punishments of exactly the same character, and to shut out from the former, as must unhappily be generally done from the latter, all hope of restoration. Society, however, may by means of transportation, carried out in different forms, be happily rid of both. The first may be punished by being forced to inhabit a bleak, inhospitable country, separated, at least for a time, from his family, compelled to a certain amount of manual labour, but with hopes held out to him that by his long-continued good conduct, he may ultimately be allowed comparative liberty. The perpetrator of crimes of violence may, on the other hand, be exposed to every hardship, compelled to labour in a painful and degrading manner, unprotected from the rigours of a severe climate; and his life, justly forfeited to society, but spared by the humanity of our modern laws, may thus be worn out in misery and degradation.

I cannot but think that the broad distinction with regard to punishment that ought to be drawn between crimes of violence and cruelty and offences which, however injurious to society, may be committed by men whose moral nature is not utterly degraded, and who are, in many cases, capable of reformation, has not been sufficiently insisted upon. Judges pronounce the sentence of "penal servitude" alike on the cruel and reckless garotter and the dishonest banker; and confusion is thus produced in the public mind as to the relative enormity of their offences. I am not attempting to palliate the guilt of the man whose dishonest dealings have perhaps inflicted ruin upon hundreds; let his crimes be visited with a severe and well-merited chastisement, but we know that in such cases the criminal is often capable of reformation, that he may see the error of his ways, and become again fit for the society of his fellow men; but what hope can there be for the wretch who for some paltry plunder will wantonly inflict injury, perhaps worse than death, on a man who never injured him? Should any mercy be shown to such crimes as these? Can we fairly hope that in any number of cases there is the slightest hope of reformation? Surely not; and if so, our duty is to take the easiest and most economical means of ridding society of the criminal, and placing him in a situation where he will feel that he has no longer that legal protection to which he has forfeited his right, and where he will be far removed from, and consequently unable to injure, his fellow men.

This brings me to the objections so ably urged in the course of the discussion, more particularly by Mr. Hawes, against the system of transportation, That gentleman argued that we had no right to throw into our colonies the refuse population of the mother country; but in the plan advocated by Mr. Isbister, this is not contemplated. It is intended to devote a peculiarly inhospitable portion of our possessions abroad—a country offering little temptation to the free emigrant—to the founding of a regular penal colony, and though, doubtless, the race would be deteriorated, and the descendants of the convicts would not be either physically or morally so elevated a class as the ordinary type of Englishmen, still, on the other hand, it is well known that the sons and grandsons of convicts are now occupying honourable positions in our colonies, and even in this country, fulfilling their duties to society, and redeeming the errors of their fathers. We certainly ought not to force our reluctant colonies to receive convicts; no one would now be so rash as to attempt this; but if a territory can be found where a regular penal settlement can safely be created, it seems evident that a discharged convict would (when the colony was somewhat advanced) have a much better chance of obtaining honest employment in a country, where labour would be scarce, than in the midst of a crowded population, where, moreover, the prejudices against the employment of such persons are already strong, and are every day becoming stronger. If Mr. Isbister's description of the Hudson's Bay territories is a correct one, it is surely worthy of grave consideration, whether this at present useless portion of the earth might not be thus made available as a receptacle for criminals, and an English Siberia created where, happily, there is no fear of our sending political criminals, for we have none, but where the outcasts of society might be forced to labour for their own subsistence, without being able to prey upon their fellow men as they now do when in possession of that convenient passport to crime, the "Ticket of Leave."

I am, &c.,

G. F.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Entomological, 7.
Medical, 8½. Clinical. 1. Dr. Cockle, "On the Conditions of the Aorta simulating Aortic Insufficiency." 2. Mr. Streeter, "Disease of the Brain by Extension from the Ear." 3. Dr. Greenhalgh, "New Metrotome." 4 Dr. Richardson, "Nitrate of Amyle." Communications from Drs. Gibbs and Thudichum, Messrs. Baker, Brown, and others.
Royal United Service Inst., 8½. Commander Frederick Warren, R.N., "Bow Rudder as proposed by him."
Royal Inst., 2. General Monthly Meeting.

Tues. ...Civil Engineers, 8. Mr. Bryce McMaster, "On the Sleeper Woods of the Madras Railway."
Pathological, 8.
Photographic, 8. Annual Meeting.
Ethnological, 8. Mr. Dunn, "Some Observations on the Psychological Differences which exist among the Typical Races of Man."
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."

Wed. ...Society of Arts, 8. Mr. Alexander Burrell, "On Cooking Depots for the Working Classes recently established in Glasgow and Manchester."
Geological, 8.
Pharmaceutical, 8.

Thurs...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. Mr. Charles Darwin, M.A., "On the Existence of Two Forms, and on their Reciprocal Sexual Relation, in several Species of the genus *Linum*."
Chemical, 8.
R. Society Club, 6.
Royal Inst., 3. Dr. E. Frankland, "On Chemical Affinity."

Fri. ......Royal Inst., 8. Mr. James Glaisher, "On Aerial Scientific Research."
Philological, 8.
Archæological Inst., 4.

Sat. ......Royal Inst., 3. Mr. W. S. Savory, F.R.S., "On Life and Death."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, January 23rd*, 1863.]

Dated 21st November, 1862.

3133. C. Wagner, Liverpool—Imp. in strengthening, securing, and rendering more durable the soles or bottoms of boots, shoes, and other coverings for the feet. (A com.)

Dated 26th November, 1862.

3174. J. R. Danks, B. P. Walker, and R. P. Walker, Wolverhampton—Imp. in machinery or apparatus for making boot and shoe heel and toe tips, clog irons, and other similar articles.

Dated 27th November, 1862.

3181. D. Auld and D. Auld, jun., Glasgow—Imp. in working furnaces and steam boilers, and in apparatus connected therewith.

Dated 8th December, 1862.

3292. E. T. Hughes, 123, Chancery-lane—Imp. in galvanic apparatus. (A com.)

Dated 16th December, 1862.

3358. J. J. Lemon, 10, New Compton-street, Soho—Imp. in book trays or holders.

Dated 19th December, 1862.

3399. D. Davidson, Woodcroft, Morningside, near Edinburgh—Imp. in the construction of telescopes, and in the method of arranging and fixing the same in combination with fire-arms for the purpose of adjusting the aim thereof.
3401. J. Dalton, Brooklyn, New York—Imp. in knitting machinery.

Dated 26th December, 1862.

3455. J. Swainson, jun., Newton Stewart, Wigton, N.B.—Imp. in the manufacture of pill boxes and similar boxes from solid wood, and in machinery to be employed in the said manufacture.

Dated 29th December, 1862.

3464. A. W. Sleigh, 73, Harley-street, Cavendish-square—An improved method of rendering or making ships and vessels, and floating and shore batteries, or ambulent or stationary defences impenetrable to shot and shell, and to other missiles and projectiles, and war rams.

Dated 31st December, 1862.

3481. B. Bottomley, Rochdale—Imp. in machinery for twisting and doubling yarns or threads of cotton and other fibrous materials.
3485. J. W. P. Field, 233, High Holborn—Imp. in breech-loading fire-arms.
3487. J. M. Napier, York-road, Lambeth—Imp. in heating apparatus.

Dated 1st January, 1863.

1. R. H. Collyer, Beta-house, 8, Alpha-road, Regent's-park—Imp. in the method of, and apparatus for, preparing materials for the manufacture of paper and similar purposes, part of which invention being also applicable to other operations in which materials are subjected to the action of hot agents.
3. G. Allcroft, New Church-row, Camberwell—Imp. in pressure gauges and vacuum gauges.
5. J. T. Smith, Lee, Kent—Imp. in obtaining motive power from steam and the products of combustion.
7. J. J. Southgate, Kensington—Improved arrangements for portable fire escapes.
9. W. Soutter, Birmingham—Certain apparatus for raising and planishing metals.
11. J. E. Baker, Cheapside, and J. Landon, Crosskey-square, Little Britain—Imp. in the construction of boots, shoes, and other coverings for the feet.

Dated 2nd January, 1863.

13. F. C. Bakewell, 6, Haverstock-terrace, Hampstead—Imp. in apparatus for burning oils and other inflammable fluids as fuel. (A com.)
15. H. Lyon, 31, Sydney-street, Commercial-road—Imp. in the finish and mode of packing cigars, and in apparatus used for these purposes.
17. E. T. Hughes, 123, Chancery-lane—Imp. in producing designs upon velvets, cloth, furniture hangings, and similar materials. (A com.)
19. H. J. Sergeant, Manchester—Certain imp. in the method of dressing and finishing silk fabrics and fabrics composed of silk, cotton, and wool.

Dated 3rd January, 1863.

23. H. Jones, Manchester—Certain imp. in steam engines.
25. W. Phillippi, Stromberg, Prussia—Imp. in the manufacture of bearings and axle boxes for machinery, carriages, and railway rolling stock.
27. W. Astrop, Jubilee street, Stepney—Imp. in the manufacture of paper.
28. C. B. Clough, Lewyn Offa, Mold, Flintshire—Imp. in apparatus for curing smoky chimneys.
29. W. T. Smallware and C. B. Weaver, Fazeley, Staffordshire—Certain imp. in treating or covering strip steel or other suitable material for the making of crinoline skirts and other similar purposes for which the same may be applicable, and which same treatment or covering may be used for trimming or strengthening certain parts of ladies' dresses.

Dated 5th January, 1863.

31. E. B. Keeling, Gray's-inn—An imp. in lighting halls, theatres, and other buildings.
33. J. A. Cooper, Trowbridge, Wiltshire—The application of a fibre obtained from a certain plant as a substitute or to be used with silk, cotton, flax, and such like materials, which fibre has not hitherto been applied to any of those purposes, and for certain methods of preparing the same for such purposes.
35. H. Blacktin, Bradford—Imp. in means or apparatus for saving or preserving money, papers, or other valuable property at sea in case of shipwreck. (A com.)
37. H. Bessemer, Queen-street-place, New Cannon-street—Imp. in the construction and mode of working apparatus to be employed in pressing, moulding, shaping, embossing, crushing, shearing, and cutting metallic and other substances.
39. D. Nevin and W. Coppin, Londonderry—Imp. in machinery for clearing and separating the woody parts from the fibrous portion of flax, hemp, or other like material.

Dated 6th January, 1863.

40. J. A. Munn and J. D. Cobb, 8, Gresham-street—Imp. in automatic walking dolls and other figures. (A com.)
41. W. E. Newton, 66, Chancery-lane—Imp. in magneto-electric telegraphs. (A com.)
44. J. Leigh, Manchester—Imp. in the treatment of gas produced by the distillation of coal, cannel, bituminous shale, boghead, mineral oils, petroleum, or other combustible substances, and for the obtaining of certain products therefrom.
45. T. Vicars, sen., T. Vicars, jun., and T. Ashmore, Liverpool—Imp. in machinery for manufacturing bread, biscuits, and other like articles.
46. J. A. Knight, 4, Symond's-inn, Chancery-lane—Imp. in printing presses. (A com.)
47. M. Hodgart, Paisley—Imp. in presses for pressing cotton and other substances. (A com.)
49. J. G. Dahlke, Battersea—Imp. in machinery for cutting clay in the manufacture of bricks, tiles, and similar articles. (A com.)
50. G. Turner, Campbell-square, Northampton—A new method of making leather from waste pieces of common leather.
51. J. Whitworth and W. W. Hulse, Manchester—Imp. in ordnance.

Dated 7th January, 1863.

53. J. Neale, 11, King's-road, Ball's-pond—Imp. in the manufacture of capsules. (A com.)
54. T. F. Cashin, Sheffield—Imp. in covering wire, crinoline steel, or hoops for skirts.
55. W. Crabtree and J. Crowther, Newton-green, near Todmorden, Yorkshire—An improved mode of perching and dressing textile fabrics during the process of weaving.
56. W. S. Bruce, Great St. Helen's, Bishopsgate-street—Imp. in lucifer matches, fusees, and other similar lights, and in the boxes or holders for containing the same. (A com.)
59. G. C. Grimes, 8, Wandle-terrace, South-street, Wandsworth—Imp. in means or apparatus for treating splints used in the manufacture of matches, and other lights.
63. G. T. Bousfield, Loughborough-park, Brixton—Imp. in skate fasteners. (A com.)
64. H. Harben, Oxford-villa, Haverstock-hill—Imp. in the manufacture of fibrous material for cleansing machinery and other purposes.
65. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the permanent way of railways. (A com.)

Dated 8th January, 1863.

70. R. T. Monteith, St. Malo, France, and R. Monteith, 64, Crystal-terrace, Cecil-street, Greenheys, Manchester—Imp. in the manufacture of dyes from aniline and its analogues. (A com.)

Dated 9th January, 1863.

74. R. Thomas, 70, Berners-street, Oxford-street—Imp. in apparatus for rendering hair "wavy."
78. D. B. Parsons, 77, Upper Thames-street—Imp. in reaping and mowing machines. (Partly a com.)
80. D. Collinge, Oldham—Imp. in machinery or apparatus for cleaning and preparing cotton or other fibrous materials to be spun.
82. G. B. Price, Bedford—Imp. in sights for fire-arms.
84. M. Henry, 84, Fleet-street—Imp. in furnaces. (A com.)

Dated 10th January, 1863.

86. W. Grove, Tenbury, Worcestershire—Imp. in apparatus for sawing wood and other substances.
88. M. Vogl, Sambrook-court, Basinghall-street—An improved fastening for bags and other articles.

Dated 12th January, 1863.

92. D. Dawson, Huddersfield—Imp. in manufacturing "Magenta" colour or dye.
94. E. Stevens, 139, Cheapside—Imp. in ovens, hot plates, and cooking apparatus.
96. W. Clark, 53, Chancery-lane—Imp. in carding engines. (A com.)

Dated 13th January, 1863.

100. T. G. Lewis, Cumberland-place, Newington Butts—Imp. in apparatus applied to perambulators, invalid chairs, and other carriages.
104. W. Platts and J. Bailey, Manchester—Certain imp. in telegraphic cables.
106. C. H. Townsend and J. Young, Bristol—Improved compositions for preventing incrustation and corrosion in steam boilers and condensers.
110. C. E. Amos, The Grove, Southwark—Imp. in machinery for the manufacture of paper.
112. T. Butler, Nottingham—Imp. in the manufacture of lace in twist lace machines.
114. H. Bessemer, Queen-street-place, Cannon-street—Imp. in the manufacture and treatment of malleable iron and steel, and in furnaces, machinery, and apparatus employed in such manufacture.

Dated 14th January, 1863.

118. J. S. Butler, St. Alban's-terrace, Nottingham—Imp. in the manufacture of bobbin net made on bobbin net or twist lace machines.
120. G. A. Biddell, Ipswich—Imp. in machines for pulping turnips and other vegetable substances.
122. J. Lawson, Hope Foundry, Leeds—Imp. in apparatus for holding castings and other pieces whilst being planed or shaped.
124. G. Holt, 5, Canterbury-place, Lambeth-road—Imp. in apparatus for sweeping or cleaning chimneys, and also in apparatus for preventing chimneys from smoking.

Dated 15th January, 1862.

128. W. Hulse and C. L. Haines, Birmingham—Imp. in machinery for the manufacture of taper metallic tubes.
130. T. C. Barraclough, Manchester—Imp. in apparatus for cutting metallic tubes or pipes, or tubes or pipes composed of other indurate substances. (A com.)
136. C. Murrell, Pinfold-street, Aylsham, Norfolk—Imp. in breech-loading fire-arms.
140. A. Prince, 4, Trafalgar-square, Charing-cross—Imp. in sewing machines.

Inventions with Complete Specifications Filed.

119. G. T. Bousfield, Loughborough-park, Brixton—Imp. in machinery for rolling, grinding, and cutting files. (A com.)—14th January, 1863.
155. G. T. Bousfield, Loughborough-park, Brixton—Imp. in hot-air engines. (A com.)—17th January, 1863.

Patents Sealed.

[*From Gazette, January 23rd*, 1863.]

January 21st.

2083. R. Grogan.
2099. R. Bell.
2100. J. Leetch and B. Mathew.
2103. W. Clissold.
2106. J. G. Clarke.
2107. W. H. Perkin.
2110. H. A. Jowett.
2111. J. Redgate and H. Redgate.
2112. J. Anderson.
2113. P. Robertson.
2114. W. Clark.
2124. J. H. Selwyn.
2127. J. Walton and J. Moore.
2128. H. Bollinger.
2135. T. Cook.
2136. A. Noble.
2160. B. Bailey.
2223. N. J. Amies.
2239. W. E. Newton.
2243. N. J. Amies.
2278. J. H. Johnson.
2286. G. White, F. Buckland, and C. Rees.
2349. D. Moore.
2351. D. Moore.
2358. M. Henry.
2382. A. V. Newton.
2756. C. Thomas.
2928. G. Mayall, jun., and J. Hollingworth.
3160. E. Wadsworth.
3198. W. E. Gedge.

January 23rd.

2130. W. Spence.
2132. W. Spence.
2133. T. A. Favrichon.
2134. W. Maugham.
2337. J. Fourdrinier.
2139. F. Selby.
2140. H. Hedgely.
2141. E. Burnett.
2148. E. T. Hughes.
2150. J. Norris.
2151. C. T. Burgess.
2164. G. H. Birkbeck.
2170. E. F. Prentiss and R. A. Robertson.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, January 27th*, 1863.]

January 19th.

155. J. F. Belleville.

January 20th.

158. O. Vivier.
185. F. Yates.
190. F. G. Grice.
221. T. Dunn.
277. W. H. Tooth.

January 21st.

153. C. P. P. Laurens.
201. P. Effertz.
280. A. Watkins.

January 22nd.

165. M. Rae.
172. C. C. J. Guffroy.
209. F. Walton.

January 23rd.

166. J. Potter.
257. W. Hartley.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, January 27th*, 1863.]

January 19th.

163. J. B. P. A. Thierry, jun., J. L. Richard, and Baron H. de Martiny.
171. J. Francis.

January 20th.

313. J. Howard.

January 22nd.

218. W. Beasley.

January 23rd.

197. F. Chauchard.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 6, 1863.

SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The Council hereby convene a General Meeting of the Members of this Society, to be held on Saturday, the 7th February, at 2 o'clock, p.m., to receive a Report from the Council in reference to the intended Memorial of the Prince Consort for the Society.

By Order of the Council,
P. LE NEVE FOSTER, Secretary.
28th January, 1863.

NOTICE TO MEMBERS.

The following circular has been sent to each member of the Society:—

Society of Arts, Manufactures, and Commerce,
John-street, Adelphi, London, W.C., 30th January, 1863.

Sir,—In preparing the lists of members from which Committees of Reference are to be appointed by the Council, in conformity with the 36th bye-law, the Council desire to avail themselves, in the fullest and most useful manner, of the varied information and practical experience of all the members of the Society who may be willing to promote its objects by serving on such Committees.

To this end the Council propose to frame the lists under the nine general heads undermentioned; and they will be much obliged to you if you will inform me, on or before Monday, the 9th of February next, on which list, if any, you are willing that your name should be placed, and if you will specify any subject or subjects, in which you take a particular interest, capable of being properly included under the general head selected by you.

In the event of your not wishing your name to be placed on any of the lists, no reply is expected to this letter.

I am, Sir, your obedient servant,
P. LE NEVE FOSTER, Secretary.

I. Fine Art.
II. Agriculture.
III. Chemistry.
IV. Manufactures.
V. Mechanics and Engineering.
VI. Commerce.
VII. Colonies.
VIII. Education.
IX. Economic and Sanitary Science.

NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

A copy of a speech delivered by Mr. Harry Chester, Vice-President of the Society of Arts, and Chairman of the Committee of the Metropolitan Association for Promoting the Education of Adults, entitled "Education and Advancement for the Working Classes," will be forwarded to each Institution and Local Board.

NINTH ORDINARY MEETING.

Wednesday, February 4, 1863.

The Ninth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 4th inst., Edwin Chadwick, Esq., C.B., in the chair.

The following candidates were proposed for election as members of the Society:—

Castriota, H.R.H. Prince Georges, Skanderbeg des Rois d'Epire et d'Albanie	3a, King-st., St. James's, S.W.
Chatfield, Charles	Broad Green House, Croydon, S.
Ferguson, James	Bridge-street, Inverness, N.B.
Machaffie, David	(Messrs. John Pender and Co.), Manchester.
McKay, Dr., M.D..........	Castle-street, Inverness, N.B.
Pigott, Wm. Peter	16, Argyll-st., Regent-st., W.
Pouncy, John...............	Dorchester.
Rae, John, M.D.	21, Brompton-square, S.W., & 4, Fenchurch-street, E.C.
Ritchie, W.	16, Hill-street, Edinburgh.
Rowland, John A.	Belmont, Upper Norwood, S.
White, William	2, Waterloo-place, S.W., and Forest-hill, Sydenham, S.E.

The following Candidates were balloted for and duly elected members of the Society:—

Browne, William, jun. ...	Patent Rope Works, Wivenhoe, Colchester.
Collyer, Charles Edwards.	150, Fenchurch-street, E.C.
Dawbarn, Richard Wood.	Wisbech.
Merry, William L.	13, Pembridge-place, Bayswater, W.
Rivett, Joseph Adric......	Prestoln, near Bolton, Manchester.
Willis, James...............	42, Little Britain, E.C.

The Paper read was—

ON THE COOKING DEPOTS FOR THE WORKING CLASSES, RECENTLY ESTABLISHED ON THE SELF-SUPPORTING PRINCIPLE AT GLASGOW AND MANCHESTER, WITH SUGGESTIONS FOR INTRODUCING THEM IN THE METROPOLIS.

By Alexander Burrell, F.S.A.

Six weeks ago, one of your Vice-Presidents, Mr. Winkworth, called my attention to the account in your *Journal* of a paper read by Mr. Taylor, in this room, on "Dwelling Houses for the Working Classes," and of the very interesting and instructive discussion which ensued on it. I had at the time just returned from Glasgow, where I had visited and inspected the "Cooking depôts for the working classes," which, having during the last two years been established there, had risen from very slight to very large dimensions, and, in connection with the existing Lancashire distress, had deservedly attracted the attention of the public as a most successful experiment, affording to the working classes an abundance of cheap and well-cooked food, as a *bonâ fide* mercantile question of profit and loss, in a way by which working men could avail themselves of the food so produced without accepting charitable assistance, thus preserving that feeling which to them ought to be, and to a large extent is, as dear as to any other portion of the community, while its existence is the best guarantee of the soundness of their principles, and of the security of all other classes in the country, I suggested to Mr. Winkworth that a description of the *modus operandi* of these institutions would be an appropriate sequel to Mr. Taylor's paper, inasmuch as perhaps of equal, if not superior, importance to the comfortable and respectable housing of the working classes is the affording them an abundant supply of good and well cooked food. I added, that having taken full notes of the statistics, &c., of the Glasgow depôts during my visit, and having access to further materials if required, I would be glad, provided your Council were prepared to accept such a proposal, to be of service to any member of the Society disposed to read a paper of the kind, by giving him my notes and affording him any other assistance in my power.

The result, however, was, that I was most unexpectedly invited to prepare and read the paper myself. After some consideration I expressed my willingness to do so, and immediately collected the necessary facts, visited Manchester, where several establishments of the kind had been more recently set a-going, and prepared my paper to be read at your meeting of 21st January. To suit the convenience of a gentleman who had engaged to read another paper, but who was to leave England at the end of January, I agreed to postpone mine till this evening. During the interval a series of most important and admirable articles descriptive of the Glasgow scheme have appeared in the press. First, an article in "Good Words," which, going over the same ground, rendered it necessary for me to surrender a considerable part of my statistics, &c. Then on Thursday last, there appeared simultaneously in the *Times* and *Cornhill Magazine* for February, published that day, articles on the subject which not only far excelled anything that I could pretend to produce, but, dealing with the very same facts and figures, have so familiarised the public with what I had to explain, that I was again forestalled. I have endeavoured however, by recasting my paper, to avoid laying before you stale information in a style infinitely below that in which it had been treated in the distinguished organs of public opinion to which I have referred.

I have to crave your indulgence for making these personal explanations. I have ventured to trouble you with them for two reasons—first, to explain how it was that I came to undertake such a task; and, second, to deprecate any severe criticism of the style and form of my paper, in the special and unfavourable circumstances in which I have been called on to draw it up. One effect, however, of this predicament, and which after all may be in my favour, is, that I have neither the inclination nor the temptation of indulging in the rhetoric or sentimentalities of the subject, and that I am in a measure forced to confine myself to its practical bearings and details, and to submit to you illustrations of the actual working of the system.

The merit of practically carrying out the scheme in question is due to Mr. Thomas Corbett, of Glasgow, a gentleman very well known in the west of Scotland, not only for his great sagacity and energy as a man of business and as a most successful merchant, but also as one of that large and invaluable class of our practical men who, amid the incessant toils and cares of business, can still afford time and thought, as well as large pecuniary assistance, to any cause having the welfare and improvement of their fellow men in view. It is nothing new to myself, or others acquainted with Glasgow during the last fifteen years, to be told of Mr. Corbett's efforts in various objects of philanthropic interest. Though his success in the present undertaking has been signal, speedy, and certain, that may be attributed to the large experience, and, I may add, to the wisdom taught by previous failures and disappointments in similar philanthropic objects. I mention this in order to draw the practical conclusion that it is not by any sudden stroke that such an effort is at once successful, that the principle is not enough, but requires the man to work it out, and that the man must be possessed of the qualities of experience, judgment, and prudence, to make the project successful. I may be permitted also to add, what is well known in his own district, that much of that success is due to the warm and active sympathies and co-operation of his esteemed wife in all his philanthropic labours, a fact which Mr. Corbett will be the first to acknowledge.

In a communication with which Mr. Corbett has favoured me, he states that the idea of providing better, and at the same time cheaper, food for the working classes by the establishment of a central cooking depôt, first occurred to him from reading an article in the *Cornhill Magazine* of June, 1860, under the title of "The Poor Man's Kitchen." Many of you may have read that article at the time, but I shall quote a few sentences from it for the purpose of shewing you the appeal which the writer made, and how completely Mr. Corbett has responded to it.

After treating of a subject which has again come up before public attention, viz., the relative superiority of the diet afforded to prisoners in the public prisons to that enjoyed by the working classes, showing that it is not so much owing to superior food but good cooking, the writer draws these conclusions:—"That prisoners are well fed, that the diet provided is beyond the means of many poor families, and that there must be something wrong if criminals are so much better off than the honest artisan, who is starving with his family on a pittance of 20s. a week. That there is something wrong it is not necessary to deny. But the question may be raised, whether the wrong lies in our system of prison discipline? If the fare which is provided for our criminals is good and ample, is even generous, there is this also to be remembered, at the same time, that it is dirt cheap. It is so cheap that when the cost of it is mentioned everybody will at once admit that the idea of lowering the price still further would be a ridiculous meanness. At the Clerkenwell House of Correction the diet which we have described is provided to each prisoner at the cost of certainly not more than 4d. a day. The average cost of feeding all the prisoners in that gaol during the year 1859 was 2s. a week for each man; but as this average is struck so as to include the second and third-class prisoners, there will be a difference in the calculation if we take account only of the first-class prisoners receiving first-class fare. That difference, however, must be very slight, as among the 1,200 daily inmates of the prison there is but a sprinkling of the second and third-class criminals. We are clearly within the mark if we put down 4d. a day for each man. At the Ely House of Correction the charge is 3¼d. for each. At the Salford New Bailey the daily cost of food is 2⅜d. a head. For the whole of England the average cost of each prisoner's diet is 3⅝d. a day.

"What is the inference to be deduced from such a fact? Will anybody say that our prisoners are extravagantly fed? It is surely palpable that in a comparison with the diet of prisoners, the fare of our honest poor looks meagre enough; that if a premium seems to be placed on crime by the goodness of the penitentiary kitchen, there may be a wrong somewhere; but it is certainly not in the system of prison discipline. Surely the wrong is not that prisoners are so well fed, but that honest men are worse fed. Why should they be worse fed? They pay far more than fourpence a day for their food, and that food is not nearly so nice, nor so wholesome, as that which every pickpocket obtains. The proper inference is that in prisons these things are managed well, while in the poor man's dwelling they are managed badly. It is entirely an affair of management.

"There are two great losses which the poor man suffers from. In the first place he has to buy from the retail dealer, and consequently pays more for every article that he requires. He has to pay so much indeed for each item, that a number of little delicacies, which he has to buy fresh every day in order to give a flavour to his food, such as parsley, cost him far more than they are worth—cost, it may be, two or three hundred per cent. beyond their real value. In the second place, after he has got all his articles of food together, there is a great deal of waste, because things are prepared on a small scale. He will buy bone with his meat, but he is unable to turn the bone to account: or he gets too much fat with his meat, and he has either to cut it off or to throw it into the pot, so as to spoil the dinner. Besides which, in nine cases out of ten, his wife is a vile cook, and would spoil the best of food. What with buying his things dear, buying what he cannot turn to any use, and having to trust to the tender mercies of those culinary artists who are said to be chiefly provided by the enemy of mankind, the working man's teeth enjoy but poor practice. The remedy for the startling contrast between the dinner tables of the thief in prison and

honesty in a garret, is not to place the felon on shorter commons, but to teach honesty the art of combination, and to bring that system of the division of labour, which in manufactures has achieved the most splendid results, to bear upon the ordinary economy of human life.

"It is a very humiliating reflection that eating and drinking occupy more of our thoughts than anything else in heaven above or in the earth beneath. We are not yet as the lilies that take no thought of such matters. Man is like the lower animals in this respect, that with the vast majority of our race, the struggle for existence is a struggle for dinner. We have all somewhat of the Tartar Khan in us, and after we ourselves have dined, are ready to proclaim that the whole world may dine also. But we first. Nobody shall dine, with our good-will, if we are starving. Who can count all the wars, murders, and quarrels that have arisen out of this one question of dinner—the question of questions? How many of the piteous cases that come before Sir Cresswell Cresswell are to be explained by deficiency of food, badness of cooking, and fits of indigestion? There is no such visitant as hunger and deranged gastronomy. If we could only get at the wisdom which is supposed to lie in ancient fables, we should probably find that Pandora's box, the source of every mischief, was an empty oven or larder, or some such receptacle. The poor man especially feels the truth of this doctrine. He conspires against the rich because he never gets a dinner, and on that point he feels with the great Cham. He beats his wife because, with his hard won earnings, she can place only bad food before him. He drinks beer and drowns himself in gin, because no meat that he can get is half so pleasant. People imagine that by introducing the light wines of France into this country, we shall put a stop to drunkenness. It is a great mistake. The French are a sober people, not because they drink wine, but because they are good cooks. Where you have bad cookery and good liquor, depend upon it the liquor will carry the day. And we shall not stop the rage for liquor in this country by making it still better, by turning the gin into Cognac, and by turning the beer into Bordeaux. The cure lies rather in restoring the balance between meat and drink. Put the meat on a par with the drink, and then see what the result will be. Either teach the poor man to cook, or give him his meat well cooked. Let the temperance leagues and alliances look to it; they will accomplish far more good by improving the working man's edibles than by meddling with his potables—by seconding that natural law which makes a man chiefly dependent on his food, rather than by attempting to place artificial barriers in the way of his getting whatever drink he may require. The best cure for the drunkenness of the lower classes is not a Maine Liquor Law, but soup and sausages, puddings and pies; is not to shut the beer-shops, but to open the 'Poor Man's Kitchen.'"

Such was the appeal which arrested the attention of Mr. Corbett. Though he is not a teetotaller, yet, like all philanthropic men, he laments the prevalence of that sad habit of drunkenness which debases and destroys so many of our working classes. He had long joined in the efforts of the "Glasgow Abstainers' Union," a body of gentlemen who, while maintaining the strictest principles of their profession, have not only sought but obtained the pecuniary support of all classes in Glasgow, though not quite agreeing in the wisdom of total abstinence, and who, besides struggling for repressive measures against public-houses, have, by a well planned and energetically arranged system of cheap concerts, excursions, and amusements for the working classes of Glasgow, also done a very great work indeed in that city in rivalling the more dangerous attractions afforded by the public-house, the casino, and the dram-shop. Co-operating, therefore, with them, Mr. Corbett determined that his establishments should be practically non-intoxicating, thus in a double sense answering the challenge of the writer in "The Cornhill."

The first of Mr. Corbett's establishments was set a-going on the 21st September, 1860, in a portion of the buildings of the Sailor's Home, on the Broomielaw of Glasgow, very much, as a locality, answering to the Wapping of London. There were two halls on one floor, taken at a rent of £100 a-year, and calculated to accommodate 100 persons at one time. Here the movement was initiated, and in a few days proved to be a complete and wonderful success. The rooms were comfortable, well lighted, warmed, and ventilated, kept scrupulously clean, provided with newspapers and magazines, and the uniform charge for any article of diet was one penny. It met "a felt want," and was instantly appreciated by the working classes. The success which attended it led Mr. Corbett to open a second branch a few weeks later, then another, and another—a new one every two months or so up to the present time, so that at this moment there are 13 in full operation capable of accommodating 3,000 persons at one time—employing a staff of 135 persons, consisting of one manager, one cashier, one inspector, three vanmen, and one kitchen-man, in all, seven males, with 128 females, including 13 matrons, one at each establishment, and 115 waitresses, paying an aggregate rent of £1,140 per annum, disposing of penny rations of all kinds to the enormous extent of 18,000 a day, involving a gross income of £10,000 a year, and, finally, frequented by no less than 8,500 persons on the average every working-day of the week. These establishments have been spread through the districts chiefly frequented by working men, two of them in premises formerly occupied as large whisky shops. I can best illustrate the localities by stating to a London audience that two have been planted in King-street and the Salt-market (the latter familiar to the readers of "Rob Roy"), districts answering to that of St. Giles's here; one each in the vicinities of the large engineering, chemical, and other public works at Washington-street, Stobcross-street, Cowcaddens, Port Dundas, and St. Rollox; one in the locality answering to King William-street in this City, viz., Jamaica-street, accommodating 600 persons at a time in three spacious halls, at a rent of £320 a year; one each in Trongate and Argyle-streets, and the Candle-riggs—the Strand, Fleet-street, and Farringdon-street, of Glasgow—and, finally, the youngest of them all in the High-street, near the University, where I have no doubt it will afford the utmost advantage to a class of men of whom Scotland may well be proud, and of which this rich country knows little; that large body of young men rising from the lowest classes, very often working at the loom, the bench, or the plough, during the summer months, yet possessed of that stern habit of economy and resolute determination to rise in the world which I may fairly claim as characteristic of my countrymen, literally saving from the very sweat of their brows the means of obtaining a university education during the winter months. Perhaps there are some now listening to me, who, like myself, with somewhat better means, but still like many of the middle classes in Scotland, pressed by the *res augusta domi*, remembering the short commons and indifferent comforts of our university life, will not fail to appreciate the advantages such an establishment will afford to the large majority of Scottish university students.

The branches have now become so numerous as to make it absolutely necessary that a large central store and model kitchen should be erected, and arrangements are in progress for supplying this want. At the foot of Pitt-street a store and kitchen are being built, the latter of which will, we believe, be the largest in the kingdom. It will cover 1,000 square yards of ground, and will be twenty feet high in the interior; and is to be fitted up with steam-cooking boilers, ten of which are in course of manufacture. By this accession it is expected that abundant facilities will be afforded for increasing the variety of the viands supplied, and so rendering the bill of fare more attractive. The addition of a store will enable larger purchases to be made at a time, and effect an economy in the prime cost of the articles. In the mean time, every effort is being made to purchase articles of the best

quality, and in the first markets; and as an instance of this we may mention that one of the three vans belonging to the depôts is despatched every morning at six o'clock to a place six miles out of the town, and returns in time for the breakfast with the entire produce of two dairies.

One important feature of the depôts is the supplying of soup tickets to philanthropic persons at a charge of one penny each, which tickets are given to the poor in lieu of money, and, on presenting them at any of the branches, a ration of soup or broth—to be taken away, however, not consumed on the premises—is supplied at certain hours; and Mr. Corbett is now issuing tickets by which soup and broth may be obtained at half-price after five o'clock. In these hard times it is gratifying to know that large numbers of the charity tickets are sold.

I will not fatigue you by repeating here the detailed statistics of the various establishments, already so fully given in the articles referred to, but to such of you as take an interest in this department of the subject, I may refer to the tables (see Appendix). It will be more to my purpose to lay before you now, on the very best authority, that of Mr. Corbett himself, a short account of the principles upon which he has proceeded. I have the satisfaction of announcing that this part of my paper has been revised by him, and may be taken as an authentic exposition of his ideas and practice in working out the scheme.

Mr. Corbett would desire to disclaim all credit for the discovery of any superior mode of cooking, as in point of fact, the same principles, as far as the production of food is concerned, have been followed out in every poor-law union and prison in the kingdom.

The only new principle in this movement is just the appliance of strict commercial principles in the supplying of wholesome food to the working classes.

It is matter of the simplest experiment that all the articles in the bill of fare of the Glasgow Cooking Depots can be produced for about three farthings each, and it has been practically shown that if it is made a fixed principle to have these articles uniformly of the best quality, the demand will be so great that the margin of profit—say one farthing on each penny ration—will be found amply sufficient to make such institutions self-supporting.

For the guidance of persons willing to undertake the movement in London, Mr. Corbett considers it essential to keep in view the following principles:—

1. Every establishment or branch must be commodious, well lighted, heated, and ventilated, so as to be a successful competitor with the gin palaces or beer shops of the metropolis, avoiding premises where the apartments are numerous and small; the most suitable place being a large hall, which can be fitted up in the simplest manner.

2. It would be well to have such premises or hall ornamented in a cheap but attractive manner, with some ininteresting engravings, mirrors, &c., which would have the effect of elevating the working men's feelings, while his bodily wants were supplied. And it will be at once apparent that this trifling initiatory expense would not even in the slightest degree affect the remunerative character of the undertaking.

3. The articles of food provided must be few and simple, so as to avoid all waste which would arise from variety, and besides interfere with the simplicity of the arrangements, which is an essential element of success.

4. It must be laid down as a fixed principle that every article purchased shall be of the best quality, and it is pleasant to know that this has been found, by Mr. Corbett's experience, to be true economy, verifying the proverb, "that the dearest article is cheapest in the long run."

5. One of the great leading features of the movement ought to be to show working men how much comfort they can enjoy without intoxicating drinks of any kind, and it should therefore be made a distinctive principle of the movement that all such establishments be conducted on strictly temperance principles, which will be a guarantee to everyone frequenting them of a propriety of conduct which could not be otherwise secured.

6. As it is evident that no such institutions can either be permanent or successful, or even truly useful without the vital principle of being thoroughly self-supporting, it ought to be made a rule to decline presents or gifts of any kind, or even patronage. These can be of no real or important service to the movement, while they infringe upon the independent character of the institution. So thoroughly is this maxim carried out in the Glasgow establishments, that no gift, even of literary publications, would be received; so that the working man may feel that his newspaper or magazine, as well as his bowl of soup, is included in his penny bill of fare. And in connection with this principle it should also be made a fixed rule that no servant connected with any of the establishments should receive, on any pretence, any gratuity or gift whatever, under pain of instant dismissal.

7. Finally, it has been found in working out this scheme that the more commodious and handsome the premises are, the more successful have they been, and if such a movement is commenced in London, it would be exceedingly desirable to have the various branches in the most leading thoroughfares, and, as before observed, to have them not only commodious but thoroughly lighted and ventilated; in short, to make them as regards locality, comfort, &c., equals or rivals of the London gin palaces.

I now come to explain the progress of the scheme in Manchester. The first establishment of the kind there was founded by Mr. John Pender, M.P. for Totness; it was opened on the 25th November last, in the lower portion of a large mill in South Junction-street, Albion-street, under the name of "The Gaythorn Working Men's Dining Rooms and Cooking Depôt." Three rooms on the ground floor are occupied, one as a large hall capable of accommodating at one time 300 persons, a second as the kitchen, stores, &c., and the third is occupied as a reading-room, furnished with daily and weekly papers, and other useful and entertaining periodicals, free to those who have used the dining-rooms. Attached to, but independent of the dining-rooms, is a charitable kitchen for dispensing free rations, called "The Finch-street Kitchen." to which Mr. Pender intends devoting the profits made in the former. At present the service staff consists of nine males, a superintendent, seven men, and a boy, and fourteen females, a matron, sub-matron, and twelve waitresses, the latter selected from factory workers out of employment.

The second in order of time was that opened on 3rd December last, by Mr. Hugh Birley, called "The Irwell Dining Hall," situated in New Bailey-street. These premises are very well adapted for the purpose; they were originally built for a concert-hall and dancing saloon, and had been for some time unoccupied. The principal room, used as the dining-hall, measures 47 feet by 37, and is 27 feet high. It is lighted from the roof by means of a large skylight, and at night by gas pendants also from the roof. It has been fitted up for the accommodation of 200 persons, a small compartment near the door being partitioned off for the accommodation of women. The kitchen adjoins the hall on the same floor, with room above for the female domestics, and the cellars, stores, &c., are in vaults beneath. Daily papers and other periodicals are placed on the tables for the use of the visitors. The staff consists of a manager, matron, and ten female waitresses, the latter selected from Mr. Birley's sewing school.

About the same time a third establishment was opened, called "The Heyrod-street Self-supporting Cooking Depôt," in a large building formerly occupied as "The People's Institute," well known in the days of the Chartist Movement as the favourite resort of Fergus O'Connor and his coadjutors, and latterly occupied as a Ragged School. This institution has been opened under the guarantee of a Committee consisting of Mr. H. B. Jackson, Canon Richson, Mr. James Chadwick, and Mr.

Richard Johnson, the latter acting as Secretary. The building has been divided into two rooms, one for men and another for women, and is calculated for the accommodation of 300 at a time.

The only other to which I shall advert in detail is that established by Mrs. Eason Wilkinson, at 18, Oxford-street, called "The Manchester Kitchen for the People," where there is accommodation for about 200 at a time. This lady includes in her scheme the training of girls in the arts of cooking and housekeeping.

All these have been set going on the Glasgow model, and are managed on the same principle of being self-supporting; but others of the kind, affording more or less of charitable assistance to the distressed operatives, have also been organised by benevolent ladies and gentlemen, among which I may particularise "The Ardwick Cooking Kitchen" of Miss Hilton, at Summer-place, Ardwick; "The Working Men's Dining and Coffee Rooms," Nelson-street, Angel-meadow, which my time will not permit me further to notice. Of the Manchester establishments it may, however, generally be said that all of them have adopted the *modus operandi* of Mr. Corbett, their managers or matrons having been instructed in the system at Glasgow, where Mr. Corbett's managers are always willing to receive and instruct anyone visiting his establishments.

Several objections have been stated to the working out of these principles, and it may be convenient, in order to elicit the state of opinion as regards them in the discussion which is to follow on the paper, that I should shortly indicate such of them as have come under my notice. The first of these objections to which I will advert is, that such institutions must tend to wean the working man from his home. I have not anywhere seen this argument better stated than in the *Standard* newspaper, which thus refers to it:—

"The associative principle is developing itself in so many forms that it cannot be long before we have it applied to 'The Cooking for the Million.' It is part of the common progress, and this not the less that it will be an improvement, not without some serious drawbacks. We may disguise it as we like, but it will be the Parisian *café* and the West-end club introduced into British humble life, and so far, will be another step to that annihilation of "home" to which so many influences seem to be carrying us. The attractions that tie the working man to the domestic centre are already by no means in excess; and they will hardly increase as new means are found out to furnish cheap and pleasant modes of spending his hours elsewhere. The ale-house, concert, and music and dancing saloons, and institutions of the like order, are already doing their work on our town populations; and when we shall have given them the cooking establishments which may supply excellent dinners at wholesale prices, we shall have completed all the arrangements to qualify a great part of the mothers of humble life to join in the lament of the Belgravian matrons, and express the discontent of an inevitable position by spasmodic agitations for some dubious rights of women. But the revolution is there, and we must meet it not the less that we can give it but a dubious welcome. The working men will have cookery, and will have it cheap, even should it happen that home prove exactly the place where they will be least likely to meet with it. In the present state of our society it is a satisfaction to which they have become entitled, and which the course of things tends to press on them; and that said, all the rest follows as a matter of course. They know too much to continue their present system of unsatisfactory food, dearly bought and badly cooked; and if they did not, there are too many active observers amongst us to look patiently on an annual waste by millions, exactly where no waste can be comfortably afforded."

Now here is an answer to the objection, which I quote from the *Glasgow Herald*, for the reason that it states the opinion, and has the sanction, of Mr. Corbett himself:—

"An idea is entertained by some people that the depôt is calculated to supersede domestic cookery. The impression is quite erroneous. Mr. Corbett has satisfied himself, by the most thorough investigation, that any really thrifty, managing housewife can provide her husband and family with meals quite as good and at even less money. The cooking at the depôt is quite plain and simple, and is attended to by persons no more experienced than a tradesman's wife is in the higher and more difficult departments of the culinary art. What they can do at the depôt she can do at home, and at less cost; and if a man can have as good a dinner at home, and can dine there as conveniently, he will never hesitate for a moment between it and the depôt. The careful housewife, therefore, need look with no jealous eye on the increasing popularity of the "Great Western;" it cannot, and does not, propose to compete with her. Its aim is to provide first-rate food at a low price to those who cannot get it elsewhere—for instance, to lads in lodgings, and to men and women working at a great distance from their homes. Of course, if a married man has to choose between a tough, tasteless bit of meat in a dirty home, and a nice plate of beef and potatoes in a comfortable room, he may prefer the latter; but the effect of this will be good. It will stimulate careless and slatternly women to keep their houses nice and clean, and prepare their meals with more regard to the human palate and human powers of mastication and digestion. If they do that, as they all can do if they please, they have nothing to fear from the innocent attractions of the cooking depôt. It generally requires a good deal of dirt and discomfort to drive a working man from the place where he can eat his meals with the faces of his wife and children round him, and it is consolatory to think that if they *are* driven from home, they can now go to the cooking depôt instead of the public house."*

The next objection is that these establishments do not add a glass of good beer at a penny to the food rations. You have already heard how decided Mr. Corbett is on this subject. At his establishment, water is supplied at pleasure, and very good lemonade and soda water at one penny per bottle, costing him, I believe, 9d. a dozen, producing his full quota of profit of one farthing per article. As I prefer quoting the actual arguments, I now give the objection from the article in "Good Words," and the reply from the *Glasgow Herald*:—

"If Mr. Corbett," says the writer in "Good Words," "could enable the working man to wash down his dinner with an Imperial half-pint of beer for a penny, he would confer a real boon on his customers. In Scotland this is not so much required as in England, but in either country, if such a want could be satisfied in such a place, it would do away with all excuse for adjournment to the public-house, and in many ways would be a real benefit to the working people. The penny ration of beer, like the other penny rations, might be made the maximum supply, and if so, such places could never become the haunt of the drunken and improvident. On the contrary, the decent regularity of a clean, cheap, and comfortable dinner, accompanied by a half-pint of sound beer, might, in multitudes of cases, by making plain the use as distinguished from the abuse, beget temperate habits, and cause a wise discrimination which would be most beneficial to the working men of Great Britain."

"On the contrary," says the *Glasgow Herald*, "the absence of all intoxicating liquors is a marked feature in the depôt scheme—a feature, we believe, as much valued by the working men who frequent them as approved by others. No doubt there are a few of them who would relish, and would be willing to pay for, a glass of ale or porter, but they feel that the exclusion of all intoxicants, while it removes the temptation to additiona

* It may be mentioned that, at the establishment in Heyrod-street, Ancoats, Manchester, the following notice appears on one of the bills:—"Cans, suitable for carrying soup, meat, and potatoes, will be supplied, on payment of a small charge, to those who may be desirous of taking their food home."

and really unnecessary expense, guarantees them from the possibility of being ever disturbed in any branch they may choose to go to by any outbursts of alcoholic excitement or uproar. To the absence of all liquors in these places we must, no doubt attribute very much the absence of all rudeness and disorder. At any rate, it is impossible to speak too highly of the exemplary conduct of those who frequent them. We have inspected several of the branches ourselves—at the thronged hours, too—and have on every occasion found the working men and lads behaving with the civility and decorum of gentlemen. Those who speak of the inherent rudeness of working men in Scotland, because they have been rudely jostled by great louts who have reeled from the tavern, should visit one of the branches of the Great Western Cooking Depôt."

I shall now advert to what may be called the Tobacco Question. Mr. Corbett on the one hand, and Messrs. Birley and Pender on the other, differ, I believe, on this point. I shall illustrate it by reference first to the *Quarterly Review*, in the article which I have already quoted, and again by a quotation from "Good Words."

First, then for the *Quarterly Review*:—

"Another point, the mention of which may perhaps provoke a smile, but cannot be slighted with impunity, is, that full and complete toleration must be accorded to smoking. The pipe is deemed an indispensable comfort by many working men, and they are apt to remain deaf to every inducement so long as it is withheld. It is not, indeed, needful that more than one room should be set apart for the smokers, for there are those of their own class who object to tobacco. But accommodation of some sort must be provided for them or they will desert to the public-house to enjoy their pipes in peace. The truth is, restraint of every kind, beyond what is absolutely necessary for order and propriety, should be studiously avoided. The very name of 'free and easy' given to the social meeting in the tap-room, shows plainly enough what is supposed to be attractive by those whose livelihood depends on conciliating working men."

And then from the writer in "Good Words:"—"It is well-known that the great working-day luxury of large numbers of our operatives is a smoke after meals. Those who move constantly amongst them know how intensely a 'blast of the pipe' is enjoyed in the interval between the close of the meal and the resumption of work. This almost universally felt want ought to be provided for. A well ventilated smoking-room, to which smokers could adjourn and enjoy the fragrant weed, would be a real improvement worthy the consideration of the proprietor, and most certainly worthy the attention of those who contemplate starting such establishments elsewhere. Smoking may be a weakness, a great injury to the health, and a great waste of money that might be better spent. The world, however, has decided otherwise. At present, tobacco smoking is a luxury as tyrannical almost as any natural want, and its comfortable enjoyment ought to be provided for."

I must confess that on the prin iple of taking the working man as he is, and looking to the general and everyday habit of smoking in all classes, I would be disposed to think that a means for indulging this habit ought to be afforded in all institutions of the kind, always provided that this should be done in such a way as not to interfere with the taste and comfort of those who have not a liking for the dear, dirty, delightful, and disgusting indulgence.

Lastly, I have now respectfully to offer suggestions for introducing in London establishments of the kind, with such modifications as may best suit the special circumstances of the metropolis.

It is desirable, in the first place, that immediate steps should be taken to set going a large cooking depôt, in temporary premises, to afford a practical illustration of the Glasgow scheme. Several gentlemen have offered to provide funds for the purpose, and I have for some time been looking out for a proper place. We had fixed on the Borough as a suitable locality, as being in a district where working men were very numerous, and where, owing to the present railway works connected with the London, Chatham, and Dover Railway, a large body of men are constantly at work at distances from their homes. It occurred to me that part of the extensive buildings of the southern wing of St. Thomas' Hospital, now vacant, would be admirably suited for for the purpose. The large and spacious wards now empty in that building, with the excellent light and ventilation they possess, the facilities for cooking, &c., which could be had at so very little expense, and the admirable situation, all concur in pointing out this as one of the best temporary sites in London. The property is now advertised for sale in the spring—any fittings necessary for converting a portion of it into a cooking depôt, could be put up and taken down in a few days, so that its interim occupation in this way need not interfere with the sale, and it could be vacated at the shortest notice. I made an application to Mr. Smiles, the Secretary of the South Eastern Railway, on the subject, but as his instructions were for a sale, he could not then entertain any other proposal. I trust, however, that if ever the idea is supported by the public generally, the Directors of the Railway would readily consent to give, for a moderate rent, such part of the premises as might be wanted for temporary occupation. If this could be attained, in the course of ten days (such is the state of forwardness of our plans and preparations), a central depôt, on the Glasgow plan, could be in operation, showing the exact working of the system.

In the second place, however, as regards London, the enormous extent at once of the field to be occupied, and what I am sure is the general desire to help in the work, makes it desirable that the scheme should be established on a scale far exceeding anything of the kind hitherto attempted in any other locality, and I would suggest that a permanent establishment, worthy of this great metropolis, should be at once organised for that purpose.

1. A combined effort should at once be made to raise by subscription such a sum as will be sufficient to erect in some central and suitable locality a large hall capable of accommodating at least 1,000 persons, with the necessary cooking apparatus and appliances.

2. That it should be called "The London Model Self-supporting Cooking Depôt for the Working Classes."

3. That there should be attached facilities for cooking not only the food that might be consumed on the premises, but as the demand springs up, for affording supplies to branch establishments within such a circuit as would ensure their delivery in proper condition.

4. That these branches should not do any cooking themselves, but be supplied from this central establishment with all the rations required by light spring vans employed for the purpose, and that they should be limited to reheating the food so supplied when necessary, except in the case of tea and coffee, which can be made on the premises. In this way a variety of small establishments, in suitable localities, in cheaply rented premises, could be spread over the metropolis, under charge of respectable females, who, being supplied with the rations, &c., at wholesale prices, might derive a profit by selling them in retail at the society's tariff, to which they should be bound to adhere, as well as to the rules generally of the central establishment, the whole subject to inspection by its officers; the fittings and furnishings to be supplied at cost price from the central depôt, so as to ensure economy and a perfect uniformity of system. In this way the individual efforts of those disposed to aid in the movement, or even of persons in humble life willing to make a profit by it, could be made available, while the distinctive principles of the movement—the exclusion of the charitable element—would be secured, and the application of the rules of uniform, economic, and energetic management and superintendence, so essential to the successful working of the system, would be maintained.

5. The Central Hall should be fitted up and furnished with every possible convenience and improvement, so as to afford models in that respect to the branch establishments. To that end, improvements or inventions in any department of the actual details, would be invited and exhibited or tried, so as to afford a fair chance of their being adopted if at all likely to facilitate or improve the existing arrangements. In short, to make the central depôt the place where all the varied skill and ingenuity of our architects, sanitary reformers, mechanics, and artizans in the adaptation of the apparatus employed throughout the whole course of the food, from the raw material till it finds its way to the consumer, may be methodised and adopted if calculated to promote in any way the great object in view.

6. In fitting-up the Central Hall, provision should be made for converting it, on a short notice, for the evening, into a music or lecture hall, where cheap concerts, lectures, balls, and other gatherings for the cheap, innocent amusement of the working classes could be produced in the way which has, in the hands of the Glasgow Union, proved, as I have already mentioned, so successful in Glasgow as the means of rivalling the casinos, low music halls, and other questionable places of resort, and where working men, their wives and families, seeking to spend the evening in harmless enjoyment, might have the means of doing so apart from the temptation of drink and its debasing tendencies. I have not time to give details, or to do more than indicate the idea, but I cannot sit down without strongly urging upon all those about to take an interest in the proposed cooking depôts, to go a step further if possible, and, while supplying the working man with good and cheap food, to add to it such harmless amusements as will attract him to your institutions, so that when his appetite is satisfied, he may not be tempted to occupy his vacant hours in the evening at the "free-and-easies," and other places of a similarly debasing kind. On this subject I cannot close more appropriately than by quoting from an article on "Institutes for Working Men," in the current number of the *Quarterly Review*:—"We cannot get rid of the desire fo recreation—woe to us if we could. It is to the mind what the free play of the limbs is to the body after constrained toil, and fits it for fresh use; and if there be any part of mankind who stand specially in need of it, surely it is the class whose day has been spent in the close air of the workshop or factory in constant and monotonous labour."

"'Mr. Chadwick has shown,' says Sir B. Brodie, in his 'Psychological Inquiries,' 'that many are driven to drinking gin as affording a temporary relief to the feelings of depression and exhaustion produced by living in a noxious atmosphere; and he gives instances of individuals who had spontaneously abandoned the habit when they were enabled to reside in a less crowded and more healthy locality, where they could breath a purer air instead of loathsome exhalations. The case of such persons is analogous to that of others who become addicted to the use of opium, as the means of relief from bodily pain.'

"Now, what gin does physically, recreation, by virtue of the connection between soul and body, also does to a certain extent by raising the spirits, and thus reacting on the nervous sensibility. Legitimate amusement, therefore, both by occupying pleasantly time that might else be spent at the gin palace, and also by diminishing the craving for physical excitement, has a directly useful tendency as an antidote to the passion for alcohol.

"Among the means for refreshing our jaded spirits there is nothing more valuable than the enjoyment of wit and humour. These faculties have, beyond doubt, been implanted in us by the Author of our being for this end, and we are not to extirpate but to cultivate them. Yet, by an alliance with impure passions, these very faculties do often do their part to degrade rather than to benefit mankind, especially in those ranks of society where the secondary restraints by which good breeding aids the cause of morals are less peremptory and efficient. What a noble object, then, it is for one who would be a benefactor of his kind to exhibit the powers of wit and humour in a pure form, and to prove the possibility of exercising them without sensuality or profaneness! The refining influence of intercourse between the different ranks of society could not be better shown than by such endeavours; and, lest any should slight the object as too humble or too easy, we may add that it is not one to be lightly achieved. It is not easy to make the distinction between, on the one hand, dealing in too subtle pleasantry for the appreciation of homely minds, and, on the other, degenerating into that which is coarse, and associated with images of an undesirable kind in the minds of the hearers. We believe, therefore, that those who take the truest and most enlarged views will be most ready to promote occasional lectures avowedly of an entertaining kind, and that those who can give such lectures with real success, will be useful labourers in the cause of social improvement.

"Passing from lectures to other appliances, we must not omit the mention of chess and draughts. Experience shows that these are much resorted to, and that they may be made to take the place of more questionable games. One writer urges, as a practical man, that at any rate a room should be specially set apart for chess and draughts; and we believe him to be right.

"But it is to music that we look for one of our strongest allies in improving the recreation of the working men. It is a pleasure which can be shared by their families, and one which is invariably popular. In some neighbourhoods the public-house, the small theatre, and the casino offer the only opportunities for its enjoyment. Not only, therefore, because it is in itself a valuable source of pure pleasure, but because it is now made to minister on a vast scale to temptation and vice, is it desirable to present it in an innocent form. What with learning and practising, and what with an occasional performance before friends and neighbours, it is surprising how much time may be spent in a harmless and pleasurable way through a taste for music. Accordingly, singing-classes, and classes for instrumental music, are strongly insisted upon by all who have much experience of the pursuits of English mechanics; and when some proficiency has been attained, an amateur concert makes an agreeable variety in the conduct of an institution, serves to advertise its advantages to the neighbourhood, and enables its musical members to show their skill to their friends and acquaintance."

APPENDIX.

GLASGOW COOKING DEPÔTS.—JANUARY, 1863.

BRANCHES.	ACCOMMODATION.		Rent.	Staff.
	Premises.	Persons.		
			£	
1. Broomielaw	Two large halls, including kitchen	100	100	26
2. Clyde-place	Ditto	300	90	7
3. King-street	Large hall	100	60	3
4. Saltmarket	Two rooms	80	20	2
5. Irongate	Two large halls and several rooms	500	165	20
6. Argyll-street	Two halls and females' room	250	80	6
7. Candleriggs	One hall and room	150	25	4
8. JAMAICA STREET	Three large halls and females' room	600	320	36
9. Washington-street	Two large halls, &c.	200	80	6
10. Stopcross-street	Three rooms	70	30	2
11. Curcaddens	One large hall, and females' room	200	60	4
12. Port Dundas	Hall and several boxes.	150	35	3
13. N. Rollex ?	One large hall and do.	150	35	3
14. High-street	One do. do.	150	40	3
		3,000	1,140	125

Statement for December, 1862. — Glasgow Cooking Depôts.

		Quantities.		Rations.	
1. Scotch broth		6,643½	gallons.	39,861	1 pint.
2. Soup		5,645½	,,	33,873	
		12,289		73,734	
3. Beef	for soup	4,460	lbs.		
	boiled	4,936½	,,	39,492	2 oz.
	collops	8,402	,,	67,216	
		17,798½		106,708	
4. Bread	Loaves	9,750	No.	78,000	4 oz.
	Rolls	33,972	,,	33,972	
	Biscuits	3,843	,,	3,843	
				115,815	
5. Potatoes		287 bags. 574 cwt.		64,288	plates.
6.	Milk	1,340½	galls.	26,810	basins.
	Cream	222¼	,,		
7. Oatmeal		4,480	lbs.	17,920	
8. Tea		211	,,	37,136	cups.
9. Coffee		287	,,	50,512	
10. Sugar		3,596½	,,		
11. Butter		1,607½	,,		
12. Cheese		383¾	,,		
13. Eggs		660	dozen.		
14. Mustard, Pepper and Salt		723	lbs.		
15. For Washing and Cleaning		99½	,,	Brown Soap.	
		383½	,,	Soft Soap.	
		316	,,	Soda.	

Messrs. Muir and Son, of Manchester, estimate the cost of fitting up a room to accommodate 100 persons at a time, for breakfast, dinner, and tea, as follows:—

	£	s.
Boilers, cooking stoves, tea and coffee apparatus...	28	10
Tables and seats	24	8
Table ware, knives, forks, and spoons	20	0
Lighting, £10; Scullery, £15; Fixtures, Weights, Measures, &c., £15	40	0
	£112	18

DISCUSSION.

The Chairman said he understood they were honoured by the presence of Mr. Corbett, and he begged to call upon that gentleman to favour them with some observations on this highly interesting subject.

Mr. Corbett replied that he really had nothing to add to the very copious explanations which had been given by Mr. Burrell in his paper.

Mr. Cook wished to state that no later than in December last he visited one of these cooking depôts in Glasgow, and there partook of a basin of soup, for which he paid a penny; and he could testify in favour of Mr. Corbett's establishments, that he had seldom tasted better provisions, whilst, in quantity, nothing was left to be desired by the most hungry customer. During his stay in Glasgow the most lively interest was manifested in these establishments by other classes than those for whose benefit they had been instituted, and ladies of high rank visited them and tasted the food which was there provided. He fully agreed in the opinion which had been expressed by Mr. Burrell as to the desirability of introducing similar establishments into the metropolis, because he believed the poorer classes were more imposed upon, and were generally worse supplied with articles of food, than almost any other class.

Mr. Batty, as one who had been brought up an artisan, would state that in London, Birmingham, and other large towns, there existed at the present time abundance of places at which the working man could be supplied with a decent basin of soup and bread for 2½d. He considered it a degrading reflection that it should be said of the poorer classes that they did not know how to cook food for themselves. He should be sorry to trust to these establishments to supply him with food, because he could not but think that there was a temptation on the part of those connected with them to purchase inferior qualities of provisions, and retail them so as to make much larger profits than had been described in the paper. He thought they ought not to introduce these large establishments, which would take away the living of hundreds of little tradesmen who had to pay rates and taxes, and by whom he considered the working classes, who required such accommodation, were supplied with food at as reasonable a price as could be expected. He fully subscribed to the objection to which allusion had been made in the paper, that these large establishments, conducted in the manner that had been described, tended to wean the working man from his domestic circle; and he was of opinion that the great object to be sought for was to teach the poorer classes how to cook for themselves.

Mr. Hilton would call the attention of the meeting to a paper which was read before this Society several sessions ago, upon the trades and habits of street-hawkers,* in which a very vivid comparison was drawn between the meretricious attractions of the gin-palace, with its glare of light and handsome fittings, and the dirty, dull, uninviting coffee-house at the opposite corner of the street, the internal appointments of which were certainly not of a character to tempt the working classes. He could not go with the speaker who preceded him in considering that the food and accommodation supplied to the working man at those establishments where he could now get a basin of soup and bread for 2½d. were such as he required. Putting aside the question of profit, which he believed was the last consideration, he was of opinion that the establishments described by Mr. Burrell would confer immense advantages upon those of the working classes who, from the nature of their occupation, in large towns, were constantly shifting from one place to another. In London large numbers of artisans worked daily two, three, and four miles from their homes. Where were those men to go for their dinners? A great many took cold food with them in the morning, and went to the public house to eat their midday meal, amidst the fumes of tobacco. Without going minutely into all these matters, he believed such a system as Mr. Burrell had described would be hailed as a great boon by the working men of this metropolis. It was a remarkable fact which had been stated to them that those low-priced dining establishments were capable of being conducted on the liberal scale described, and yet return a profit of 25 per cent., which was generally admitted to be a fair return for investments in trade. He was quite sure these establishments would receive very large patronage from the classes whom they were intended to benefit, and he had not the least fear that they would be otherwise than self-supporting. He thought they must not look to have these central depôts in London too large, but that they would require to be diffused in localities where they were most needed.

Mr. Hugh Birley remarked that, like Mr. Corbett, he might have said, after the very comprehensive paper read that evening, it was scarcely necessary for him to make any remarks, for in his opinion they were not met to argue upon any debateable question, but to discuss a matter so clear, simple, and valuable, that the only surprise to all must be that it had not been thought of long ago. He was surprised to hear a gentleman who avowed his connection with the working classes express any doubt as to the value of this system; in fact, that gentleman had more than doubts, for he appeared to think it would be injurious and demoralising to the working man. He

* See *Journal*, Vol. V., p. 298.

confessed he entirely differed from that opinion. His experience in Manchester, which had not been very long, was quite sufficient to show the value of these institutions. He had never heard a hint of the kind suggested by Mr. Batty. There seemed to be one universal feeling on the part of the working classes, that this was a decided boon to them. They seemed to understand and appreciate it thoroughly. His own expectation was that at first there would be a good deal of hesitation; that the people would wonder what it meant; whether it was a charitable scheme, which would be repugnant to the man of independent feelings, or whether it was only to be tried for a month or two and then to be put an end to. But instead of that, he might say from the commencement the working classes had entered heartily into the movement, and the attendance at these cooking depôts had been exceedingly regular. There was one point he had remarked which touched upon the question of domesticity alluded to by one of the speakers—that was, that when the men were not at their work there was a great falling off in the attendance at these establishments. During Christmas time, on Saturdays, when they left off earlier, and on Mondays, when they were not always regular at their work, there was a very marked falling off at the dining-rooms, which was a satisfactory proof that they preferred going home when it was equally convenient for them to do so. He would urge another point—There was no reason why cooked food should not be taken from these establishments to the houses of the working classes, which would be a great saving of time to the wife, who, in addition to the charge of her family often worked at the mill. He thought a well-cooked dinner, which only required the final heating supplied at the house of the working man, would tend as much to promote the harmony of the domestic circle as a badly-cooked dinner prepared by a woman who had little time at her disposal for the purpose. So much then for the domesticity of the question. The plan adopted in Manchester had been taken from that originated by Mr. Corbett in Glasgow. The establishments were conducted with the greatest order; everything was clean and neat; and this had a tendency to elevate and refine the mind of the working man, an advantage which he seemed to thoroughly understand. He had not seen a single instance of misconduct in the establishment with which he was connected. He had seen men come in a partial state of intoxication who appeared awed by the orderly state of things around them, and he had thought what a mistake it would be to introduce into such places even the moderate use of intoxicating liquors. He would not like to send a partially intoxicated man away a little more intoxicated than he was before. Then as to the large number of boys and youths who attended these rooms, they learned better habits than the public-house could teach. He thought the introduction of beer would lower the tone of these institutions. He did not profess to be a total abstainer himself, but he had seen the value of the system as carried out in Glasgow, and he had followed out that system in Manchester, and had found it to be a perfect success there. He would say further, that the diet supplied was not of a nature calculated to stimulate the passion for intoxicating drink. The plain soup, meat, and coffee sent a man away little disposed to seek the public-house. Lemonade, soda-water, and ginger-beer were supplied at a penny per bottle, so that if the people were thirsty, they had abundant means of quenching their thirst, and he had found that working men were not anxious to get stimulating drinks when they could be supplied with those which were not so at moderate prices; but it unfortunately happened that in many public institutions the incentives to intoxication were put before the people, and none of the incentives to temperance. He therefore thought the course which Mr. Corbett had taken was the right one, and he rejoiced to find it was proposed to imitate it in the metropolis, where he was quite sure they could have establishments of this kind which would prove of immense benefit to the working population. He concurred with the proposal of having several large central establishments. Hitherto all that had been done in this direction had resulted from private enterprise; but if they had begun upon too ambitious a scale, there was risk of temporary failure, which might discourage those who were the warmest advocates of the system. It was a matter of time to induce people to quit their old haunts and frequent new ones, and this remark applied more to those portions of the day when working men were led to attend public-houses, which it was part of the object of these institutions to wean them from. He had prepared a few statistics of his own establishment, which it might interest the meeting to hear. A daily record was kept of the number of attendances, as well as of the quantity of food supplied. The average daily attendance was 660. In the month of January last the number was a little over 17,000, and he had a record of individual expenditure during the last ten or twelve days of that month, which showed 32 at a ½d., 1,604 at a 1d., 915 at 1½d., and 1,201 at 2½d., the average being about 2¼d. per head.

The Chairman inquired what was the average daily cost of a working man maintaining himself entirely at these establishments.

Mr. Birley replied, taking all meals would cost from 6d. to 7d. per day.

Mr. G. F. Wilson, F.R.S., said, in confirmation of what Mr. Birley had told them, he might mention a similar instance which originated entirely from the action of working men themselves. This was at the works of Price's Candle Company, where a large number of workmen were employed in the night, and an arrangement was made for engaging a cook to prepare the food brought by the men themselves. That system went on for some years, but it was found that the cooks gradually introduced a sub-trade for their own benefit—supplying provisions on their own account. This was winked at at first, until it came to be a rather large concern of a private character. His brother had since been at the expense of building a proper room, and fitting it with cooking apparatus, and two cooks were engaged at 25s. per week each, and by that plan a substantial meal of meat, with potatoes and greens, was supplied for 5d. That was done in the neighbourhood of London, paying the wages to the cooks which he had mentioned. On comparing the rates at Glasgow and Manchester with the London prices, he thought the system carried out in the north might be introduced here at a slightly increased rate.*

Dr. Riddell said his attention had been directed for many years past to the benefiting of mankind in connection with our domestic institutions, and the means of adapting the productions of the animal and vegetable kingdom so as to afford the greatest amount of nutriment to the human race as food. It was a natural instinct of all animals to be fond of good food, and why should man be an exception to that rule? and why should not the working man have the best food that his means would permit him to obtain? In the case of these institutions, a man might attend and get his meals (however cheaply they might be supplied), and leave his wife and family but scanty provision at home; but if the wife were taught how to cook the food which it was within her husband's means to supply, he believed the man would prefer to have his meals at home, notwithstanding the attractions of the penny basin of soup and the newspaper to read. He would engage to make good nutritive soup for any public kitchen at sixpence per gallon, which, of course, could be sold, to yield a good profit, at a penny per pint. The great advantage of these establishments would be to those workmen who were unmarried, and had no dwellings except

* Prices of provisions supplied at Sherwood Works, Battersea:—Tea, ¾ of a pint, ½d. Coffee, ¾ of a pint, ½d. Cooked meat, without bone, mutton, beef, roast pork, &c., 1s. per lb. Bread and butter, 6 ozs. 1d. Cake, 3 to 4 ozs., 1d. Soup, per full pint, 1d. Potatoes, ½d. Other vegetables, ½d. Plum pudding, about 6 ozs., 1d. Rice, bread pudding, 8 ozs., 1d.

the room in which they slept. The great point, in his opinion, was to instruct the rising generation of females how to prepare food to the best advantage, so as to be at the same time palatable and nutritious, and he had never neglected any opportunity of impressing the importance of that branch of training upon those who were entrusted with the education of young females in any public schools and institutions.

Mr. Soul (Secretary of the Orphan Working School) stated that in that institution cookery was a branch of female education, but it was impossible in large establishments to give them that training which was applicable to the requirements of a family. He thought they were much indebted to Mr. Burrell for having brought the subject before a London audience, and also to those gentlemen of whom mention had deservedly been made as the founders of these establishments in Glasgow and Manchester. He considered such depôts were greatly needed in the metropolis. There were thousands of young men who were obliged to dine daily at eating-houses to whom this system might be made applicable as the means of providing them with a better dinner and superior accommodation at a considerable sum below what they now paid. At the buildings going on in every part of London, workmen might be seen eating their dinner, sitting upon a wet, cold stone, with their wives, who had brought the meal, with only an accompaniment of cold tea or coffee. To such the establishment of a cooking depôt upon the plan described would be an immense advantage. The experience of the institution with which he was connected, as well as of others, proved that where food was prepared in large quantities, and in a proper manner, it could be supplied at incredibly low rates, and leave a profit. In the Orphan Working School the expense of food and washing did not exceed 4s. per head per week. In a similar institution at Croydon, in connexion with the Society of Friends, the average cost was 4s. 6d. per week. It was the same in the London Orphan Asylum. In the City of London School for Sons of Freemen, it was 5s. per week; and at a school in Yorkshire, where they had the advantage of obtaining the produce of a farm, the cost was as low as 3s. 7d. per head per week, and he had heard of instances in other parts of the country even lower than that. Looking to the vast area of the metropolis, he apprehended that, to make this system effective, the central establishments would require to be very numerous, from which more wide-spread branches could be supplied,—indeed, they might multiply the branches to almost any extent required. This paper was useful as having taught them the value of the penny, for the majority of the articles supplied from those depôts were sold at that price, although the meat was charged twopence.

Mr. Maclure said the point had been raised as to whether these institutions could be made paying, and, at the same time, advantageous to the classes for whom they were established. He was surprised to hear an expression of disapproval of this system from one who avowed himself as belonging to the working classes. He was the more surprised to hear the objection raised on the ground that it would prove injurious to the domesticity of the working man. He could hardly conceive that the great body of operatives working all day, many of them at long distances from their homes, with only a limited time allowed them for meals, could go home and receive as good a meal as could be supplied to them in establishments of this character. One speaker had said he could make good soup for sixpence per gallon, or less than a penny per pint: but could anyone say that the wife of an operative could make good soup for that cost? The results they had heard of could only be obtained by the preparation of food in very large quantities, and by the most economical modes of cookery. He could not conceive how it could have entered the mind of any person that such a system as this was calculated to have a demoralising tendency upon the working man or to alienate him from the family circle. Looking at the great advantages which the system was calculated to confer upon the working-classes, he hoped the attempt would be made to establish it upon a large scale in London.

Mr. Nash totally discarded the objection that had been raised against these establishments, on the ground that the system would derange the domestic habits of the community for whose benefit it was set on foot. His only surprise was that the movement had not been made long since. Mr. Nash proceeded to point out the successful results which had attended a similar establishment thirty years ago at the Lanark Twist Mills, where 2,000 persons were employed. He believed that nothing but the most complete success would attend the establishment of these depôts in London, and that the poorer classes would be greatly benefited by them.

Mr. Newton Wilson would refer to one phase of the question which was prominent in his own mind, but which had not been alluded to by those who had preceded him. There was one peculiar feature about London which distinguished it from any of the towns in which this system had been adopted. He had lived in Glasgow, and he had been an employer of labour for many years in Manchester. In the latter place each working man for the most part lived with his family in a cottage, and was not confined merely to the occupation of one apartment, and they had the means of cooking for themselves, with fuel at a very reasonable price. In London, from the large size of the houses and the high rents, the operative was obliged to live in one room. Any one who visited those apartments, as he had done, would find that they had neither cooking ranges nor ovens, and fuel was too costly in London to admit of the extensive use of it. If, therefore, such a system as they had heard of had been successful in Manchester, where they had conveniences for cooking, and fuel at a moderate cost, it would be infinitely more valuable in London. He rejoiced to hear that such a scheme had been proposed for this metropolis, and he believed it was the right course to take. It had been stated that the plan was carried out on a limited scale by a philanthropist in Scotland 30 years ago, but still it was unknown in London at the present day. He thought it was an institution which deserved their warmest support, and although objections might be raised against it by the present class of coffee-house and eating-house proprietors, there could not be a difference of opinion as to the benefit it would confer upon the working classes of the metropolis.

Dr. Edward Smith thought the promoters of this movement had every reason to be satisfied with this discussion, as expressive of a general concurrence in the system which had been brought under their notice. At the same time he did not think they could enter into it with that spirit of heartiness which they did in the North, where a large amount of other good work was also in operation. He had been through the North, and had visited those establishments from which food was supplied to the working classes, and he had been perfectly astonished at the vast organisation which existed throughout those districts for accomplishing these objects. He was also surprised at the excellence of the food itself, and the low prices at which it was supplied. He had in his possession upwards of 100 of these dietaries, which he should take an opportunity of publishing, and he was sure they would create as much surprise in the minds of those who read them as they had done in his own. There were, so to speak, two distinct methods in which such a system could be carried out; one was the supply of food at the bare cost price; the other was to supply it at prices which left a small profit upon each article, to meet the expenses of the establishment. He had seen this system in operation in Glasgow, and his belief was that it was an unmixed good. He could not conceive that there could be the least objection to its extension, if occasion required it, or to its intro-

duction into London. There were, however, a few things which it struck him it would be well to mention by way of caution in any future proceedings in this direction. He had no fault to find with the existing institutions. They were well conducted, and supplied good food at extremely small prices. At the same time he thought there was a tendency to certain evils which he would briefly refer to. In the first place, he assumed, as a necessary condition, that the collateral expenses of the establishment should be kept down to the lowest possible amount. What was the main object in the establishment of these institutions? He took it that it was not a charitable but a philanthropic means of doing a large amount of good, not making it a mere commercial enterprise. The gentlemen who had set these establishments on foot had not done it to make money, but they only wished to recover the money they had expended with perhaps a small amount of interest for it. Taking that view of the question—to what class of the working population did they address themselves? They were divided into many classes. In Manchester, the fine spinners—even such as were employed now— received 50s. per week wages, while the coarse spinners were paid only from 15s. to 18s. per week. He would therefore ask to what class did they intend to direct their attention? Regarding these philanthropic institutions, they ought to consider, mainly, the lower division of the working class. Those who especially needed their help at this time were the very poor; therefore, that must guide the whole question. Mention had been made of the character of these establishments, and he thought he saw in Manchester that they were getting too good-looking establishments. Working men would not go into such fine-looking places. That of Mr. Pender, in his opinion, fulfilled the purposes the best of any he had seen. There they had the floor of a large mill kept scrupulously clean and neatly furnished. It did not drive away the lower division, by being apparently too costly, and did not attract too much the upper division of the working class. He would therefore say, with regard to every detail of the establishment, that the strictest economy should be exercised, and that would enable them to give the greatest amount of food for the money. He thought it fair, if the basin of soup cost three farthings, that it should be sold for a penny, and that a portion of the meat should be given with the soup. He would make one remark, with reference to the tea and coffee, that as there was very little nutriment in either tea or coffee of themselves, the object should be to supply as much sugar and milk as possible, both of which contained a great amount of nutriment. With regard also to the size of the establishments, he did not think they could be made self-supporting unless they were conducted on a large scale, as the profit, though a good per-centage on some articles, was small upon the whole; and with regard to central establishments, he believed the fewer centres they could manage with the better, because the food could always be better cooked in large quantities, and could be distributed easily from the centres to the branches. He thought it very desirable, in commencing an establishment of this kind in London, to begin with one on a large scale, and from thence distribute to the branches. With regard to the introduction of intoxicating liquors, it was thought by some to be injudicious, because their aim should be to supply the largest amount of food at the smallest cost; if they added beer they introduced an expensive article. As far as he had seen of these establishments, he believed them to be of vast benefit.

Mr. W. HAWES said in looking at the introduction of a new system into this metropolis, it was necessary not only that they should clearly understand the principles upon which the scheme was brought before them, but that they should be satisfied it was not, as his friend Dr. Smith said, philanthropic only, but self supporting. He believed the working men of this country would value this institution less if it were regarded as a philanthropic rather than as a commercial enterprise.

Dr. SMITH said he had used the term philanthropic as distinguished from charitable.

Mr. HAWES said the argument as he understood it was that philanthropy was to be exercised in bringing the cost of the articles to that point that the establishment should just pay its own expenses; that a pint of soup, costing three farthings, should be sold for a penny. Then the question was, would that difference pay the expenses of these establishments? If it fell short of paying interest on the capital, and the ordinary expenses, then their philanthropy verged closely upon charity. The first question then was, what was the principle involved? That was, buying at wholesale prices and selling at the cheapest rate that could be done to the advantage of the working classes. He believed this could be done advantageously. Hundreds of thousands of persons left their homes in the morning and could not return to them till the evening, no matter how good cooks their wives might be, or how comfortable their houses were; and, at present, they were not supplied with a mid-day meal so cheaply as they ought to be. In addition to that, they had the large class who had no wives to cook their food, and no homes where it could be cooked; and in that class alone there were sufficient to support a vast number of these institutions in the metropolis. They had their penny postage, their twopenny baths; they had, in a variety of cases, proved that the labour and capital of intelligent persons might be so combined as to produce most advantageous results to those who had neither capital nor labour to dispose of. Could anyone doubt that that which was the means of giving more wholesome food was good? What better contributed to make a man go through the labours of the day than good food? And if they supplied the poor with a sufficiency of this, it acted favourably upon the poor-rates and upon the hospitals, and it conduced in every way to render the people more contented, and the health of a town better than would otherwise be the case. They were, therefore, much indebted to the gentleman who had brought this subject before them. He repeated his conviction that there could be no question as to the amount of good that would be done, but at the same time they must satisfy the public that it could be done upon those principles which they looked for in associations of this kind; and unless they could show that it would more than merely pay, he did not think they would have the support of capitalists. He could not give his assent to the observations which had been made as to the exclusion of beer from those establishments. He believed the working-man must have his beer, and to ask him to take his dinner with only a glass of water, was asking of him more than he would do. By this means he believed they kept out of these establishments a class of men to whom they would be of the greatest utility, and drove them to the public-house.

The CHAIRMAN said that much of what he had intended to say on the peculiar needs of such institutions in London, had been anticipated by Mr. Hawes and by other gentlemen. It was essential, no doubt, to the success of such new establishments, that they should be based, not upon charity or upon benevolence, but upon thoroughly sound commercial principles of remuneration and self-support. The later economical principles were not of buying cheap and selling dear, but of buying cheap and selling cheap, quick returns of small profits in ready money purchases, and always consulting the interests of the consumer. He knew an eminent merchant, who had made a great fortune, chiefly by adhering to this principle, and consulting closely the interests of the consumer. Asking him how it was, that with such simple principles, the application of which had been so profitable, he had not had more competitors, the answer was, that the persons who could see the extent and bearing of a simple economical principle, and who had the ability and nerve to apply it constantly against the temptations of immediate profit, were really un-

common. Common-place speculators or managers could not resist the temptation of buying occasionally low-priced and inferior meat, and would not see the commercial importance in the long run of having everything at all times of the best quality. Such persons, if left to themselves, would relax the order and discipline of which they could not see the commercial importance. Hence it was most important, at the outset of the new institutions, that they should have the superintendence of such practised and successful leaders of industry, men of enlarged commercial views, as the gentlemen who had originated, and by their superintendence achieved, the success which had been gained in Glasgow and Manchester. Hence, also, it was desirable that ladies accomplished in household management should give such superintendence, to see that the cookery was of the best, and that order was maintained amongst the female attendants, as had been given by Mrs. Eason Wilkinson and Mrs. Corbett. Such priceless voluntary service appeared to him to be necessary, in the first instance, to ensure the complete success of the commercial principle. As to there being any detriment to household economy or to home associations from such institutions, he deemed that illusory. The prejudice against most clubs for the wealthier classes, on that score, had little foundation in fact. The proportion of regular diners, or livers at the clubs, were a minority of the whole number of members, often a very small minority, mostly bachelors and widowers, and the married men dined at clubs only occasionally, and the same principle would apply to the new establishments for working-men. In some of the existing clubs, cookery was taught to servants, and the proposed new institutions might also be used as means for teaching cookery to the working-classes; indeed, Mrs. Eason Wilkinson had provided for the teaching of cookery to females at her dining-rooms. As had been stated, there was a large proportion of the working population with no real homes, or means of cooking, and with only inferior sleeping places. With the assured means of production at wholesale prices, and of a cheap ready money distribution, they were not justified in setting them aside on speculative objections, which actual practice in Glasgow and Manchester proved to be illusory. Why should they keep the labouring classes in towns dependent on the expensive, and, after all, wretchedly ill-paid distribution, by small retail shops, and on the ruinous credit-system? The recent experience of the great firm to which Mr. Hugh Birley belonged showed how great was the loss of the labouring classes under the existing wretched conditions. That experience proved that a given amount of wages expended on food in small retail shops, on credit, and which produced only 1½ days' subsistence, when so provided in the retail ready-money shops produced two days' subsistence, and when expended on goods purchased wholesale for ready money, provided nearly three days' subsistence. He might here be permitted to mention that that firm had, at their own cost, nobly supported their workpeople during the recent distress, an instance of generosity which he thought should not be unnoticed. Mr. Hugh Birley had told them that the average number dining at his rooms was about 600 daily. The purchase, preparation, and sending out the daily food to such a number would, on the common system, occupy probably fifteen or twenty separate small retail establishments. Hence there were probably fifteen or twenty rents, rates, and taxes; fifteen or twenty cooking apparatus, of inferior economical power; fifteen or twenty sets of persons, of an inferior class; fifteen or twenty establishments, purchasing and living on credit, commonly distributing on credit, as against the one large establishment, purchasing wholesale for ready money the best commodities, converting them with superior and more economical mechanical appliances, such as had been displayed (those in Mr. Muir's drawings), and distributing them more economically for ready money. It was mainly these economical elements, the larger wholesale ready-money purchases, the avoidance of the waste of multiplied inferior establishments, and the economical distribution to large numbers, which effected the economy adverted to in the paper as existing in large public establishments. The result already attained, with profits amounting, as had been stated, to nearly one-third of each penny paid, was to give, he believed, about two and a-half days' subsistence (a sufficient healthy subsistence, as had been stated, at sixpence halfpenny per diem, with new comforts) as against the present one and a half day's inferior subsistence, only obtainable for the same amount of money. It really appeared to amount to that. The lateness of the hour prevented him adverting to some sanitary considerations involved in the question, or doing more than proposing to Mr. Burrell the thanks of the meeting for the very important paper which he had read to them.

The vote of thanks having been passed,

Mr. BURRELL, in acknowledging the compliment, remarked that it was not to be supposed that one central establishment would be sufficient for all London. It would probably require fifty establishments on an equally large scale. As to the demoralising tendency of the system upon the working classes, he was wholly at a loss to conceive how such an idea as that could for a moment be entertained.

On the wall were exhibited diagrams of a series of the placards which are posted in the different institutions in Glasgow and Manchester, containing the bills of fare, charges, and regulations of the establishments. There were also diagrams of the apparatus used in cooking and serving the rations. On the table were arranged complete sets of the ware used at the various depôts, contributed by Mrs. Eason Wilkinson, Mr. Birley, Mr. Pender, M.P., and Rev. Canon Richson. In one of the Society's rooms a cooking apparatus had been erected, and rations had been prepared, identical in every respect with those ordinarily consumed by the working men and women frequenting the depôts at Glasgow and Manchester. These had been kindly supplied by Mrs. Wilkinson and Mr. Birley. Mr. Muir, of Manchester, took charge of this department, having furnished the cooking apparatus, and superintended the preparation of the rations, and the audience were invited to partake of the provisions, and to inspect the actual cooking of them; Mr. Muir, who had fitted up the depôts in Glasgow and Manchester, was in attendance to explain the details.

The Secretary announced that on Wednesday evening next, the 11th February, a paper by Mr. Thomas Webster, "On the Submarine Telegraph," would be read.

ARTISTIC COPYRIGHT.

A useful manual* of the Law of Art Copyright, containing the Art Copyright Act, 1862, prepared by

* The Law of Art Copyright; containing the Engraving, Sculpture, and Designs Acts; the International Copyright Act, and the Art Copyright Act, 1862, with copious Legal, Explanatory, and Practical Notes, &c.; with an Appendix, and Forms of Transfer and Reservation for the Use of Artists, &c. By E. M. UNDERDOWN, Esq., of the Inner Temple, Barrister-at-Law. Published by John Crockford, Wellington-street, Strand.

the Committee of the Society of Arts, and passed last session and also the Engravings, Sculpture, Designs, and International Copyright Acts, has been recently published. The introductory chapter gives an account of the history of artistic copyright in this country from the time of Hogarth. To the text of all the enactments now in force are added notes of cases bearing upon the subject, and remarks upon the summary procedure. The Appendix contains the evidence furnished by artists and others to the Committee of the Society of Arts.

Home Correspondence.

THE SUBMARINE TELEGRAPH.

SIR,—"Believe nothing you hear, and only half of that which you see," was the maxim inculcated by the late eminent hydrographer, Admiral Sir T. Beaufort, when I first took command under his direction in 1830.

I do not, therefore, allow mere assertion or opinion to satisfy me where facts should be forthcoming, and when I assert, it is with the intention of proof if needed. I allow every man his opinion, and, if suddenly advanced as an opinion, treat it merely as such; it may be reversed on reflection. I claim the same for myself. I never doubted "magnetic storms" and perturbations—having with others recorded them—but I doubt the aurora as a cause; it is matter of opinion even if it be a result. For myself, and my staff of observers, no disturbance was noticed under the presence of a vivid aurora. The magnetic disturbances I find, from my correspondence with the first authorities of the day, have been noted before, or after, or without the appearance of the aurora; and the same high authorities have no direct proof beyond opinion which will solve these matters. I have noticed as a peculiar fact that the aurora does not prevail much above the parallel of 70° north, and, further, that the period of its appearance in 1825-26-27-52-53-54, ranged about the 27th August. I leave this matter for the opinions of our *savans.*

Directly bearing on the laying down of deep-sea telegraphic cables—rate of sinking, and currents of great depths—I think the following data may furnish those about to discuss this question on the 11th instant with matter for previous thought, for it will be seen that the observations made by Sir James Ross and myself, at stations far asunder, nearly at the same time, and on the same meridian, possess a peculiar interest, and it was by mere chance I discovered that he had pursued precisely the same formula in noting his operations. In my own case I decided on using the smallest possible line with a lead of 12 lbs.

Sir James Ross used spunyarn, with a weight of 340 lbs.; in both cases line was sacrificed:—First, in H.M.S. *Samarang*, 20th March, 1843, 0° 24′ N., lon. 10° 37′ W., calm—weight 12 lbs., line whipcord, sustaining 56 lbs. to 1 fath.; the following result was obtained:—

No. 1.

DEEP-SEA SOUNDINGS AND TEMPERATURES, 20TH MARCH, 1843; LAT. 0° 24′ N., LONG. 10° 27′ W.; CALM; WEIGHT LEAD, 12lb.; LINE, WHIPCORD.

Fathoms.				Fathoms.			
0	...	2·57·38		1,600	...	3·53·35·2	
100	...	2·59· 8		1,700	...	3·59·12	
200	...	3· 0·56		1,800	...	4· 3·54	
300	...	3· 3· 2		1,900	...	4· 8·24	
400	...	3· 5·10		2,000	...	4·14. 7·2	= 51·34·0
500	...	3· 7·23·2		2,100	...	4·18·11·2	
600	...	3·10·16·8		2,200	...	4·22·15·2	
700	...	3·12·51·2		2,300	...	4·29·30	
800	...	3·15·51·2		2,400	...	4·39·18	
900	...	3·19·15·2		2,500	...	4·44·33·2	
1,000	...	3·22·33·2	= 24·55·2	2,600	...	4·49·57·2	
1,100	...	3·26·24		2,700	...	4·54·39·2	
1,200	...	3·32·10		2,800	..	5· 0·26	
1,300	...	3·36·57·2		2,900	...	5· 6·24	
1,400	...	3·42·24	†	3,000	...	5·11· 0	= 56·52·8
1,500	...	3·48·27·2		65 broke.			

† The last 100 fathoms seemed to have struck and accelerated the motion. (Query, current?)

At 2,000 fathoms a second lead of 12lb. was sent down by messenger, but it does not appear to have materially accelerated the descent.

			Per 100.
Thus we have for 1,000 fathoms	......	24·55·2	...... 3·18
2,000 ,,	......	51·34·0	...... 5·43
3,000 ,,	......	56·52·8	...... 4·36

Time for 3,000 fathoms...... 2·13·22

No. 2.

SIR JAMES ROSS IN H.M.S. *Erebus*, 3RD MARCH, 1843. LAT. 68° 34′ S.; LONG. 12° 49′ W.

		m.	s.		m.	s.	2nd diff.
First 1,000 fathoms		13	39	Rate 100 fathoms	1	50	
							— 0 33
2,000 ,,		21	35	,,	2	23	
							— 1 44
3,000 ,,		32	19	,,	4	7	
							— 0 22
4,000 ,,		44	16	,,	*4	29	
Time for 4,000 ,,	1	51	49				
					lbs.		
3,000 ,,	1	17	33	....	340		
							diff. 55 39
Samarang	2	13	22	....	12		

ROSS AGAIN. LAT. 52° 10′ S. 336 lbs.

Fathoms.		m.	s.
500	....	1	21
1,000	....	1	48
1,500	....	2	6

I was not before aware that Sir James Ross had observed so closely by time. His notations depended on the slack line, taking a mark overboard. In the *Samarang* the line was taken off with a strain, on a very delicate reel, measuring each fathom with a brazen circumference, each revolution indicated by a trochiameter attached to the nave. It will be seen that the noted difference in

100 fathoms, at 2,900, was 5′ 58″ but
at 3,000, ,, 4′ 36″

and it suddenly broke at 3,065.

I have before observed that very delicate observations at a depth of 1,200 fathoms proved, at the Cape de Verds in 1830, and off the Galapagos, in the Pacific (Equator), 1838, that the current ran with equal velocity throughout the entire depth, and therefore we may anticipate a very strong action on any cable suspended between closely-situated elevations between this and Newfoundland.

Another unnoticed element, preventing any vessel from holding any absolute course over any proposed line, is that the "current-bearing" would prevent any vessel from observing any course but that which the elements permitted. The commander will do his best, but that will depend on his judgment under the circumstances. Any seaman would laugh at the idea of attempting to tow or lay down a cable *malgré* wind and currents.

I will add a few temperatures at the great depths to show that Sir J. Ross and myself found no extraordinary differences at 1,000 fathoms between the Equator and high southern (or northern) latitudes:—

No. 3.

TEMPERATURES AT EQUATOR.

SURFACE 79°.

Fathoms.		°
300	...	46·00
400	...	38·00 (?)
500	...	46·00
600	...	45· 5
700	...	47·00
800	...	45·00
900	42·0	40·25
1000	39·5	42.75

Belong to water bottle.

* Curiously there is the same peculiarity in both instances, a sudden increased velocity comparatively from 3,000 fathoms. In the case of the *Samarang*, I was of opinion that the lead struck bottom, and the velocity of the current at that depth, 3,000 fathoms, drew the line more rapidly, and broke it. I suspect a similar action with Sir James Ross.

Lat. 35·50 S. 1·54 E. Surface 64·5.

300	...	47·25	
400	...	44·50	
500	...	41·50	
600	...	51·25	(Current?)
700	...	39·00	
800	...	42·50	
900	...	41·25	
1000	...	39·75	

Sir James Ross. 52·10 S. 136·56 E.

Surface 43°.

150	...	42·00
300	...	41·00
450	...	40·00
600	...	39· 8

It has been observed that writers, not themselves the actors, have asserted as fact that which experience denies. It is well known that icebergs (I write from personal knowledge) travel at a rapid rate to windward, *ergo* impelled by deep water currents. How can the Gulf stream reach these shores without such unceasing action?

Yours &c.,

E. BELCHER.

THE JURY REPORT, CLASS XXXI.

Sir,—In making (at page 153 of this *Journal*), some rather severe remarks on the report of Mr. Tylor on Class XXXI. of the International Exhibition, Mr. J. G. Fitch seeks to represent the opinion given by Mr. Tylor on educational matters in England, as being influenced by the circumstance that I, as an opponent of the Government system of education in Wurtemburg, had had "the good fortune of meeting in England with a member of a jury holding similar views," in consequence of which, this report, far from being an independent work of Mr. Tylor, had become, under our "united auspices," rather a manifestation of hostile views than of real research.

Permit me, by drawing attention to the following facts, to show the great mistake of Mr. Fitch, and how he fell into that mistake.

Seeing that I am represented in the report of the Educational Commission of 1859-61, as contending, in common with others, for the abrogation of compulsory school attendance, and finding that statement repeated in Mr. Tylor's report, Mr. Fitch at once concludes that I was opposed in principle to any government intervention in education, and to the system of education of the Wurttemberg government. I beg, however, to state, that the very contrary is the case. It is a feature of the educational system of this government, that it grants subvention not only to the primary compulsory schools, but also to the voluntary pay-schools (*Fortbildungs schulen*) requiring government protection, and I have the honour of being entrusted with their general direction. Now, I cannot possibly be in opposition to my own duties, and therefore not to the government system of education. This must be clear to everyone, and I should have thought it would have been so to Mr. Fitch, the more so as he mentions himself that I am director of a Board standing at the head of the pay-schools, "quite independent of the Board of Education," indeed, but which schools the report of Mr. Tylor says, receive government subventions, the presidents of the Communal School Councils, being, moreover, usually appointed by the government. It is obvious that under such circumstances I should not be likely to be opposed to the participation of Government in the direction of educational affairs in general; and, on reflection, Mr. Fitch will, no doubt, find himself induced to give up his hastily-formed conclusion, and do justice to Mr. Tylor, remembering that it was he who started the educational question in his report on the Paris Exhibition of 1855, owing to which report the jurors of Class XXXI. may have been induced to elect him as the reporter for their class.

Mr. Fitch, being himself reporter for Class XXIX., must certainly know very well at what time and under what circumstances the jury reports were made; he knows that they were made after the dissolution of the juries, that they were to be sent by the reporters directly to the Commissioner for juries without passing through the hands of the Chairman, and that, therefore, the latter cannot be responsible for their contents. In drawing attention to this, I must, however, add that, even if I had been at full liberty to cancel the whole educational part of Mr. Tylor's report, I should not have done so. Mr. Fitch says himself, "I think that we want the opinion of such men as Mr. Tylor on the subject," and this is just my own opinion, and was my opinion, and that of my colleagues, the foreign jurors of Class XXXI., at the time when we approved of Mr. Tylor's intention to add to his report some remarks upon the question of education. I, for my part, feel very much obliged to Mr. Tylor for having led me, by these remarks, to make further inquiries into educational matters, cautioning me against too much legislation and government interference, whilst I am at the same time equally thankful for many valuable hints which I have been able to take from some of the numerous institutions connected with the Department of Science and Art at South Kensington, especially from that Department itself, which I observed with pleasure forces its aid upon nobody, and has no desire to interfere with the free development of self-supporting institutions, as, for instance, the excellent school at Bradford.

Mr. Tylor's report acknowledges, moreover, that in Class XXXI. a great progress has been observed with respect to the improvement of goods in an artistic point of view; and if this is not due to the influence of the above-mentioned institutions, this may be accounted for by their being of very recent origin, or perhaps by the circumstance that hitherto there has been a great want of competent teachers, to give instruction in Art as applied to industrial production, of which the hardware class is especially in need, but which can only be obtained in the course of time. At any rate it is very desirable that such wants should be pointed out, and, in my opinion, this may very appropriately be done in the jury reports. Should any erroneous views have crept in, I should not regard this as a matter of consequence, because there will be always some truth mixed up with them, and opportunity for correcting them is everywhere at hand. The International Exhibitions have brought men from all countries, of the most different occupations, and of the highest capabilities, to meet and to become good friends enough to exchange their views in a cordial way, and to make them known to all the civilised world. Though there are in Mr. Tylor's report some strictures, bearing upon a sphere of my own activity, to which I am devoting myself with particular pleasure, I yet did not hesitate to make arrangements to bring this very interesting report to the knowledge of the German public. On the other hand I am inclined to think that Mr. Tylor will perfectly agree with me, when I add that I am quite ready to give the same publication to any remarks directed against it, provided they bear strictly on the subject.

I am, &c.,

DR. VON STEINBEIS,

Ex-Chairman of the Jury of Class XXXI.

Stuttgard, February 1st, 1863.

MR. ISBISTER'S PAPER ON A PROPOSED PENAL SETTLEMENT.

Sir,—Notwithstanding the numerous and able letters upon this very painful subject which have appeared of late in many of the public prints, the paper read at the Society's rooms, and the discussion which followed, no immediate and permanent remedy has been as yet suggested that may be likely to effect two such desirable objects as the prevention of crime and the destruction of those nurseries of vice and crime with which all our towns

and cities are so much infested—well named, by a writer in the *Times*, "Guilt Gardens."

Discarding for the present all idea of the reformation of born and bred criminals as quite utopian, the only certain means of preventing crime and its repetition is to shut up for life all who have been guilty of atrocious crimes after the first, and for all minor offences after the second or third conviction. Our present jail room will be found more than sufficient for the purpose of life-prisons, for, from the moment that such a law shall be promulgated, the nefarious trade will be found unprofitable, and, as a certain consequence, will be in a great measure abandoned.

All that regards the treatment, education, and employment of such life prisoners may and should be left to future and very mature consideration, when the frequency and repetition of crime shall have been somewhat restrained by life imprisonment for all atrocious and repeated offences.

The severest punishments of former times, even to torture and death, failed to abate in the slightest degree the tremendous list of crimes very partially recorded in the scanty annals of those days; and it must always be borne in mind that, in nine cases out of ten, the punished convict comes out of prison a more ferocious wild beast than he went in. In fact, the word "punishment," as well as everything relating thereunto, must be eradicated from our criminal code in all but very juvenile cases. Punishment is an act of legal revenge for which the convict will make the public pay dearly when he comes out; whether on ticket-of-leave, or otherwise, is not a matter of the slightest moment.

Transportation, no matter where, is no remedy—not even a palliative. It never caused the slightest diminution of crime, when shiploads of convicted felons left our shores almost monthly, and is now nearly impracticable. It is utterly useless for the intended purpose, very costly to the nation, and is, in itself, an offence against the world, for we have no moral right to create penal settlements in other lands in order to get rid of a criminal population fostered by ourselves into gigantic proportions in the back slums of our towns and cities. Penal settlements require centuries to get rid of the convict leaven; witness the intolerable slang, an unmistakeable sign of vice, that now prevails in the colloquial languages of America, New South Wales, and Van Dieman's Land, all convict-founded colonies. Life-prisons at home, on the contrary, will become beacons not to be misunderstood, and independently of all other beneficial effects, will introduce a vast economy in our now costly and extravagant criminal law proceedings, both before and after trial.

With reference to the second great object, namely, the destruction of those nurseries of vice and crime, the wretched back slums of our towns and cities, we must first get rid of ground rents and ground landlords, an undertaking that may be readily accomplished by carrying out all indictments for nuisances against the lord of the soil instead of against the lord of the house or tenement, when all such nuisances will speedily disappear.

It is not to be expected that unless pressure from without be applied, rich and noble lords of the soil would ever of their own accord abate such intolerable nuisances as those tenements, for the substantial reason that, owing to the fearful density of the inhabitants of such localities, they yield a larger revenue than handsome rows of good houses occupying a similar amount of space.

HENRY W. REVELEY.

Reading.

Proceedings of Institutions.

METROPOLITAN ASSOCIATION FOR PROMOTING THE EDUCATION OF ADULTS.—On Tuesday, January 20th, a meeting was held at the Working Men's Institute, Hackney, to take into consideration the plans of the Association. The chair was taken by B. Tite, Esq.; and Harry Chester, Esq., chairman of the committee, Rev. C. Robins, and J. G. Fitch, Esq., attended as a deputation. Several working men present have since given in their names as candidates for examination. The speech of Mr. Chester has been reprinted for circulation. A similar meeting was held under the presidency of Sir W. Farquhar, in St. James's School rooms, Westminster, on January 27th. There was a goodly attendance of parishioners. Among the clergy present were Rev. J. Kempe (rector); Rev. S. Leathes; Rev. J. J. Oakley; Rev. J. G. Cowan; Rev. H. Jones; Rev. G. Smith; Rev. H. Geary; Rev. H. Richardson; Rev. P. H. Duval. The association was represented by the chairman and hon. secretary. On the motion of the Rector, it was resolved to establish a local board to carry out the examinations of the Society of Arts, and the plans of the Metropolitan Association.

MEETINGS FOR THE ENSUING WEEK.

MON. ...R. Geographical, 8½. 1. Consul S. S. Saunders, "Inundations of the Nile." 2. Report by Dr. Baikie, F.R.G.S., "On the Countries in the neighbourhood of the Niger." 3. Lieut. Oliver, R.A., "Notes on Madagascar."
British Architects, 8.
Medical, 8½.

TUES. ...Medical and Chirurgical, 8½.
Zoological, 9.
Civil Engineers, 8. Discussion "On the Sleeper Woods of the Madras Railway." And, if time permits, 1. Mr. John Fulton, "Description of the Drainage of Dundee." 2. Mr. A. Williams, "Description of Drainage Works of Newport (Mon)."
Syro-Egyptian, 7½. "Memoir on the Discovery of the Sacred Pace and Cubit of the Hebrews, as also of a Hebrew Christian Inscription of the year 135 of Our Lord," by the Duke of Roussillon.
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."
R. Horticultural, 1. Anniversary.

WED. ...Society of Arts, 8. Mr. Thomas Webster, "On the Submarine Telegraph."
London Inst., 7.
Graphic, 8.
Microscopical, 8. Annual Meeting.
Literary Fund, 3.
R. Soc. Literature, 8½.
Archæological Association, 8½. Rev. Prebendary Scarth, "On a Roman Villa at Combe Down, Bath."

THURS...Royal, 8½.
Antiquaries, 8½.
R. Society Club, 6.
Royal Inst., 3. Dr. E. Frankland, "On Chemical Affinity."

FRI.......Astronomical, 3. Annual Meeting.
Royal Inst., 8. Dr. E. Frankland, "On Artificial Illumination."
Royal United Service Inst., 3. Dr. M. Roth, "The Means for Scientific Physical Training, and on Rational Gymnastics."

SAT.......Royal Inst., 3. Mr. W. S. Savory, "On Life and Death."
R. Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, January 30th*, 1863.]

Dated 28th October, 1862.

2899. J. Fletcher, sen., Leeds, and J. Fletcher, jun., Newcastle-on-Tyne—Imp. in machinery for shaping iron and other metals.

Dated 31st October, 1862.

2948. T. Gibson, Berwick-upon-Tweed, T. Hall and T. Davison, Gateshead—Imp. in railway breaks.

Dated 7th November, 1862.

3014. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in decorticating grain and seeds. (A com.)

Dated 2nd December, 1862.

3229. J. Craven, J. Craven, and J. Robinson, Clayton Mill, near Bradford—Imp. in looms for weaving.

Dated 22nd December, 1862.

3418. M. Clark, Glasgow—Imp. in treating waste liquors obtained when dyeing Turkey red colours.

Dated 23rd December, 1862.

3424. C. A. F. Collette, Giberville, near Caen, France—A new kind of lace.

Dated 31st December, 1862.

3489. F. Loret, Meckling, Belgium—Imp. in constructing double weft-forks applicable to every description of power looms.

Dated 2nd January, 1863.

21. R. C. Ransome, Ipswich—Imp. in reaping machines. (A com.)

Dated 7th January, 1863.

57. T. Storey, Lancashire—Imp. in compound waterproof and ornamental fabrics.
61. T. Aveling, Rochester—Imp. in the construction of traction engines.

Dated 8th January, 1863.

69. C. Allen, Basinghall street—Imp. in apparatus for signalling on railways by detonating or explosive signals.

Dated 9th January, 1863.

71. J. Punshon, Pemberton, near Wigan—Improved means or apparatus for preventing overwinding at collieries, and to provide extra breakage power to steam engines.
73. W. H. Tucker, 6, Southampton-street, Strand—Imp. in locks, and in the modes of connecting the knobs and spindles of the same.
75. C. E. Gray, Great Suffolk-street, Borough—Imp. in wringing machines.
77. M. Cartwright, Islington—Imp. in alarums for portable and stationary uses.
79. E. T. Hughes, 123, Chancey-lane—Imp. in machinery or apparatus for printing or staining woven fabrics, warps, paper, and other articles. (A com.)
81. W. H. Moreland and J. Chappell, Loop-bridge Mill, near Belfast, Ireland—Imp. in winding, warping, beaming, or dressing machines.

Dated 10th January, 1863.

85. W. Grove, Tenbury, Worcestershire—An improved apparatus applicable to the sawing and cutting of wood or other light substances.
87. R. Luthy, 2, Thavies-inn—Imp. in hydrostatic presses.
90. F. Fenton, Mappleton, Derbyshire—Imp. in the manufacture of pulp for paper making and similar purposes.
91. E. Powers, Manchester, and J. G. Dale, Warrington—Imp. in the manufacture of caustic soda and potash, and carbonates, chromates and stannates of the same alkalis.

Dated 12th January, 1863.

93. E. D. Chattaway, 1, New Broad-street — Imp. in railway signals.
97. W. Clark, 53, Chancery-lane—Imp. in the preparation of green colouring matter. (A com.)
99. W. E. Newton, 66, Chancery-lane—Imp. in the application of power designed for stationary and traction engines, propellers, and other machinery. (A com.)

Dated 13th January, 1863.

101. J. B. Fenby, Worcester—A new or improved instrument or apparatus to be attached to organs, pianofortes, and other similar keyed musical instruments for printing the score of any music performed on the said instruments.
103. D. Tannahill and J. Tannahill, Glasgow—Imp. in rivet making machinery.
105. J. T. Stroud, Birmingham—Certain imp. in fixed and portable lights for domestic and other uses, applicable for burning gas and the mineral oils or spirits now so commonly used.
107. R. A. Brooman, 166, Fleet street—Imp. in machinery for lifting bobbins off spindles in spinning machines, and in lubricating spindles. (A com.)
108. W. Southwood, Birmingham—Imp. in machinery for manufacturing nails and brads.
109. M. Tildesley, Willenhall, Staffordshire—Imp. in the manufacture of padlocks, and other locks and their keys.
111. L. Lescuyer, 2, Carrefour de l'Observatoire, Paris—Imp. in india-rubber overshoes or goloshes.
113. J. B. Rock, Piltoh, near Barnstaple—Imp. in apparatus for saving life and property from fire and other danger in buildings and mines.

Dated 14th January, 1863.

115. J. Kidd, Cannon-row, Westminster—Imp. in apparatus for measuring the quantity of gas supplied to single burners, and increasing its illuminating power.
117. J. A. Schlumberger, Bale, Switzerland—An improved process for manufacturing colours for dyeing and printing. (A com.)
121. B. Burrows, Leicester—Imp. in looms used in weaving narrow fabrics.
123. E. Morewood, Stratford, Essex—Imp. in the manufacture of coated metallic sheets or plates and pieces, and in apparatus to be used therein.
125. T. Wilkinson, Scarborough, Yorkshire—Imp. in the manufacture of tubular steam boilers.
126. W. Johnson, 166, Buchanan-street, Glasgow—Imp. in the manufacture of chlorine and bleaching powder, carbonate of soda, and soda ash and sulphate of iron. (A com.)

Dated 15th January, 1863.

120. E. Howes, Birmingham—Imp. in railway, ship, and other lamps.
133. G. Graham, Dalquhoun Turkey-red Dye Works, and J. McLeod, Renton, Dumbarton, N.B.—Imp. in apparatus to be used in Turkey-red dyeing.
135. L. P. Josse, Paris—An improved apparatus for cleansing wheat or other grain or seeds.
139. J. W. Child, Halifax—Imp. in means or apparatus employed in spinning and weaving.
141. W. E. Newton, 66, Chancery-lane—Imp. in microscopes. (A com.)
142. D. F. Leblanc, 3, Percy-street, Bedford-square—An improved level indicator or liquid gauge. (A com.)
143. R. A. Brooman, 166, Fleet-street—Imp. in looms or machinery for the manufacture of lace and other fabrics. (A com.)

Dated 16th January, 1863.

145. L. Verdure, Tournai, Belgium—Improved slubs or rovings (in flax, hemp, and other filamentous materials), produced by the slubbing frame, and destined for fine spinning, as also for improved apparatus employed therein.
147. M. Moeglan, Cernay, France—Machinery for printing several colours in succession on the same surface.
148. E. Loysel, Cannon-street—Improved apparatus for preserving valuable property, documents, and letters in cases of shipwreck.

Dated 17th January, 1863.

149. W. Shorrock, Tockholes, near Blackburn—Certain imp. in power looms for weaving.
151. J. Lightfoot, Accrinton, Lancashire—Imp. in printing and dyeing textile fabrics and yarns.
152. I. Asche, Birkenhead—Imp. in apparatus for preventing sea-sickness.
153. J. Combe, Leeds—Imp. in machinery for spreading, drawing, and carding flax and other fibrous substances.
154. G. Haycraft, 23, Lombard-street—Imp. in powder flasks.

Dated 19th January, 1863.

157. E. Sabel, Moorgate-street—Imp. in the manufacture of artificial stone. (A com.)
159. J. Laurie, Manchester—Imp. in apparatus for churning milk and mixing liquid compounds.
160. Sir W. O. Brooke, 107, Avenue des Champs Elysees, Paris—Imp. in the manufacture of insulators for electric telegraphs.

Patents Sealed.

[*From Gazette, January 30th*, 1863.]

January 28th.

2173. C. Bedells.
2181. G. A. Biddell.
2182. J. C. Onions.
2183. R. Nurse and D. Nurse, jun.
2184. J. E. Marsh.
2185. C. H. Plevins and H. Rider.
3187. T. G. Webb.
2188. T. Onion.
2190. J. Gray.
2197. J. Higgin.
2202. A. Priestley.
2218. R. W. Ralph.
2232. J. J. H. Gebhardt.
2304. J. Carter and J. Maher.
2398. J. Davis.
2425. J. Mosheimer.
2457. W. E. Newton.
2551. W. E. Newton.
2638. R. Griffiths.
2981. J. Place.

January 30th.

2194. A. Denny and E. M. Denny.
2198. J. Townsend.
2221. F. M. Jennings.
2283. G. Welch.
2579. F. L. Forestier.
2904. C. S. Duncan.
3250. J. Grant.

[*From Gazette, February 3rd*, 1863.]

February 3rd.

2199. W. Clark.
2203. W. W. Burton.
2206. W. G. Valentin.
2208. J. H. Johnson.
2212. F. H. M. C. D. C. de Fenis de Lacombe.
2214. R. A. Brooman.
2215. R. A. Brooman.
2219. E. Hall.
2226. E. Humphrys.
2227. J. Tatham.
2236. G. T. Bousfield.
2247. J. Combe and J. H. Smalpage.
2251. W. Macnab.
2275. L. D. Verstraet and E. M. Olivier.
2317. J. Briere.
2324. W. J. Hoyle and J. Proven
2347. R. Harrington.
2360. W. E. Newton.
2365. G. Davies.
2371. G. Davies.
2491. G. Ritchie.
2559. W. Todd and J. Todd.
2609. W. Upfill and W. Asbury.
2978. J. McKean and T. Greenall.
3247. A. F. Eden.
3331. C. Hancock and S. W. Silver.
3337. J. Brown.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, February 3rd*, 1863.]

January 26th.

208. R. Sykes and J. Sykes.

January 27th.

206. C. F. Varley.
233. J. H. Johnson.
226. J. Jeffreys.
229. E. Langrn.
238. E. Brooks and H. Waters.

January 29th.

266. M. A. F. Mennons.

January 30th.

242. G. A. Cator.
250. W. E. Newton.
284. T. Blackburn and M. Knowles.
285. R. Adams.

January 31st.

274. T. Routledge.
232. H. C. Jennings.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, February 3rd*, 1863.]

January 28th.

255. J. Gretton.
390. E. Deiss.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 13, 1863.

NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

Copies of a speech delivered by Mr. Harry Chester, Vice-President of the Society of Arts, and Chairman of the Committee of the Metropolitan Association for Promoting the Education of Adults, entitled "Education and Advancement for the Working Classes," as well as of a memoir by Professor Leone Levi, F.S.A., F.S.S., "On the Metric System of Weights and Measures," with a circular on the same subject, have been forwarded to each Institution and Local Board.

SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

A General Meeting of the members of the Society was held on Saturday, the 7th inst., to receive a report from the Council in reference to the intended memorial of the Prince Consort for the Society.

Sir Thomas Phillips, F.G.S., Chairman of the Council, presided.

The Secretary read the notice convening the meeting and also the following

Report of the Council.

At a general meeting of the Society, specially convened, held on the 21st of March, 1862, the following resolution was passed unanimously:—

"That, cordially approving of the address of condolence presented by the Council to the Queen, and also of the vote of 1,000 guineas from the funds of the Society to the National Memorial, the members of the Society of Arts, in this general meeting assembled, are anxious further to record their deep sense of the irreparable loss which the Society, in common with the Queen and nation, has sustained by the most afflicting dispensation which has deprived it of its illustrious President, the Prince Consort; and this Society, being under peculiar obligations to His Royal Highness, whose zealous devotion to its interests was unceasing during the 18 years of his enlightened presidency, the members desire to testify their estimation of his great services and high qualities, by having a special memorial for the Society, and that the Council be requested to consider the most appropriate form of the memorial, and bring the matter before a meeting of the members at a fitting time."

The Council have had the foregoing resolution under their consideration, and they recommend that the memorial consist of a bust of his Royal Highness in marble, to be placed in a suitable manner in the great room of the Society, and that the funds be raised by subscription amongst the members, and that any surplus funds not required for that object be applied in such manner as the subscribers may direct; and the Council are of opinion that a gold medal, to be called the Albert medal, should be provided by the Society, to be awarded by the Council, not oftener than once a year, "for distinguished merit in promoting Arts, Manufactures, or Commerce."

The Right Hon. Sir John Pakington, Bart., G.C.B., M.P., said, having had the privilege of moving the resolution at the former meeting, on which the Council had made their report which had just been read, he might be allowed to move the adoption of the report. He had no hesitation in saying that, in his opinion, the recommendation of the Council—that they should erect in that room a bust of His Royal Highness—was the best that could have been made. That was the idea that was in his mind at the first meeting, when he moved the resolution; and he was disposed to hope, notwithstanding the fact that this Society in its corporate capacity had made a splendid donation to the National Memorial—that it would be gratifying to the feelings of every member to see a bust of His Royal Highness in that room as a tribute of respect to his memory on the part of this Society. With regard to matters of detail—whether the expense be defrayed by the subscriptions of individual members, or by a grant from the funds of the Society, was a matter which he should be content to leave to the general feeling of the meeting, though, for his part, he was desirous to move that the report of the Council be adopted.

Mr. J. H. Murchison said, having personally taken an active part in the movement of last year to obtain a memorial of the Prince Consort for the Society, he trusted he might be permitted to second the motion for the adoption of the report; and he was glad that, although occasionally he had found it necessary to find fault with the proceedings of the Council, on the present occasion, at all events, nothing should fall from him which should cause serious difference of opinion, or give rise to anything which should lead to unpleasant discussion. Last year when this question was brought before the Society, it was objected that it was premature. He was not now about to make any comment upon the wisdom or otherwise of postponing this measure, but he was glad to find that every suggestion which he then made had been adopted by the Council. The charter of this Society stated its objects to be "For the Encouragement of Arts, Manufactures, and Commerce, by bestowing rewards for such productions, inventions, or improvements, as should tend to the employment of the poor, to the increase of trade, and to the riches and honour of the kingdom." When the late Prince Consort became President of this Society, he (Mr. Murchison) recollected that his Royal Highness expressed himself highly gratified at being called to preside over a society having objects of so laudable a character, and the Prince showed the appreciation which he entertained of the mode in which this Society had promoted its great objects, by advising, soon after his election as president, a large increase in the premiums offered for inventions and improvements in arts and science. Two years after his election, the Prince himself offered a medal for the best essay on "The Cultivation and Manufacture of Sugar;" and he was sure those members of the Society who were present at the opening meeting of the session, must have been highly delighted at seeing the chairman present a prize of twenty-five guineas, given by the Prince Consort himself, in connection with the educational examinations carried on by this Society. Now, if they referred to the mode in which other institutions endeavoured to promote their objects; if they looked to Cambridge, they found that medals were offered to encourage various branches of knowledge, and they found there one given by the Prince Consort himself, as chancellor of the university. That being the case, he thought, although a bust was an appropriate method of keeping alive the memory of the Prince, yet, to perpetuate the great objects which his Royal Highness promoted when living, the founding an Albert Medal was a recommendation which was deserving of their strongest approval and support. This Society, he believed, since its foundation, had awarded no fewer than 20,000 premiums for the promotion of the arts and sciences, and if, in future, they had a medal to be denominated the Albert Medal, it would be as greatly coveted as the Copley medal of the Royal Society. That was a medal which was open to men in all branches of science, and of all nations. He did not presume to indicate in what direction the Albert medal

should be used to promote the objects of the Society, but he had consulted a great number of the members of this Society, and had received letters from some of them, indicating their views on the subject. He would only refer to one which he had received from Lord Radstock, in which his lordship, after expressing his approval of the foundation of the Albert gold medal, suggested that it should be given for the greatest practical improvement in the cheapening of articles tending to promote the comfort and health of the labouring classes, and for improvements in the construction and fittings of their dwellings. He thought, with regard to the bust, it ought certainly to be provided by the individual subscriptions of the members, as the Council had recommended, but with regard to the medal, he hoped, inasmuch as the funds of this Society had so greatly increased under the presidency of the Prince Consort, the medal would be provided from that source.

The Chairman said that was the recommendation of the Council.

Mr. Murchison was very glad to to hear it was so; and he was quite sure it would meet with the unanimous approval of the meeting. He begged to second the adoption of the report.

Mr. J. Scott Russell, F.R.S., said, before the resolution was put, he would suggest the alteration of the word "bust." A bust, as generally understood, meant a rather insignificant and common-place work of art—perhaps more insignificant and more common-place than the Council intended. If a little latitude were allowed, and the work of art were not called a bust, he should prefer it.

Mr. George Godwin, F.R.S., suggested the use of the words "sculptured memorial." He trusted that, whatever might be the result with regard to this question, the artistic element would not be lost sight of in the proposed Albert Medal, inasmuch as that was a branch of art in which they were at present very deficient, from the very little encouragement that was given it; and he believed, from the movement of the Society in this direction, and the steps they would take to obtain a fitting medal, much good would result.

Mr. Frederic Lawrence said he could not agree with the two last speakers. He thought the Council had very properly worded their report. He thought a good bust was better than a bad statue. He hoped the decision of the meeting would be in favour of a bust, which they might all admire, as the result of a competition amongst the artists of the day. He should like the sculptors to have an opportunity of exhibiting models of the bust they proposed to supply—not that one gentleman should be selected to execute it without any competition. With regard to the Albert Medal, he thought everyone in the room must heartily approve of that recommendation of the Council. At the same time he could not agree with Lord Radstock, who proposed to restrict the appropriation of that medal to purposes of a very limited character; and whilst he thought it ought not to be restricted to such purposes as those indicated, he would on his own behalf express a hope that the medal would not be appropriated to the educational department of the Society, but that it would be devoted to the main objects of the Society, namely—the promoting of Arts, Manufactures, and Commerce. He hoped it would be a valuable medal—one worth striving for—not a small mark of honour, but one which all might be proud to obtain.

After some remarks by Mr. Dutton, Mr. P. Palmer, and other members,

Mr. Underdown rose to support the resolution—that the recommendation of the Council be adopted in the matter of the bust. He agreed with them that that would be the best form of memorial. He had before his mind's eye two or three statues of His Royal Highness, the multiplication of which he did not think would tend either to promote the reputation of the Society of Arts, or add to the fame of our sculptors. He did not agree with the gentleman (Mr. Lawrence) who had suggested competition for the design of the bust. He thought the system of competition in art was bad, and had this serious drawback—that the better class of artists would not compete.

Mr. W. H. Bodkin said it must be satisfactory to the Council to find that on this question there was no substantial difference of opinion in the meeting. They were all anxious to do, in the best way in their power, honour to the memory of the late Prince. He would take the liberty of saying, having served on the committee of Council to whom this question was referred, that they had most anxiously considered it in every point of view, and after due deliberation they arrived at the conclusion that it would be better to recommend a bust; but it would be found that the wording of the report was such as to admit of any accessories to the bust which the means at command might enable them to supply, so that the report might be adopted in its present form, with the expression as it there stood, "to be placed in a suitable manner in the Great Room of this Society." He thought those words gave ample latitude to the Council to add any accessorial sculpture, or other adornment coming within the means at their disposal.

Mr. Scott Russell said if the term "bust" was to be taken in the large significance expressed by the hon. and learned gentleman, his objection was entirely removed.

Sir John Pakington wished, before the question was put, to explain a misapprehension under which he laboured when he first addressed the meeting. He admitted it was his own mistake entirely, but from the form in which the report was drawn, he was under the impression that the first clause of the report only, viz., that referring to the marble memorial, was embraced in the resolution now before the meeting, and on that account he had made no allusion to the second, and, as he regarded it, more important recommendation for the foundation of an annual gold medal, to be called the Albert Medal. He thought it most fitting and most appropriate to the great objects of this Society, of which he most cordially approved, and he hoped it would be carried out. He should have been sorry that the question should have been put without this explanation. As he had risen to make this explanation, he might advert to what had fallen from his friend Mr. Scott Russell, with regard to the first of these recommendations, viz., the bust. He did not agree with that gentleman in his remarks, depreciating, as he thought, unduly busts as works of art. They must all have in their minds many instances in which marble busts were very splendid works of art, and he thought it would not be desirable that any expression of opinion should go forth from this Society to undervalue the importance of such productions. But having said this, on the other hand, he really felt very little choice in his own mind whether they placed in that room a bust or a statue of his Royal Highness. Both, according to the merits of the sculptor, might be, and often were, splendid works of art. He thought the difficulty might be met and the matter left open by the addition of the words either "sculptured memorial," or "portrait in sculpture."

After some remarks from Mr. W. Hawes, Mr. S. Redgrave, Mr. Atkinson, Mr. Thomas Winkworth, Mr. J. H. Murchison, Sir John Pakington, and other members,

Mr. Bodkin suggested that the resolution should be passed as it stood, and if hereafter it should be found expedient to depart from it and to extend their design, the Council could report to that effect to a future meeting. His object in offering this suggestion was to promote unanimity.

The resolution, that the report be received and adopted, was then carried unanimously.

Mr. Bodkin then proposed the following resolution:—

"That if it shall be hereafter considered expedient to depart from the original proposition for a bust, the Council do report any new proposal which they desire to recommend to a meeting of the members."

The resolution, having been seconded by Mr. Dutton, was unanimously agreed to.

It was then moved and seconded.

"That the subscriptions be confined to members of the Society, and that each subscription be limited to one guinea."

This resolution having been unanimously passed,

Sir JOHN PAKINGTON proposed a vote of thanks to Sir Thomas Phillips for presiding over the meeting, which was seconded by Mr. SCOTT RUSSELL, and carried unanimously.

TENTH ORDINARY MEETING.

WEDNESDAY, FEBRUARY 11, 1863.

The Tenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 11th inst., William Hawes, Esq., Vice-President of the Society, in the chair.

The following candidates were proposed for election as members of the Society :—

Bright, Sir Charles	1, Victoria-street, Westminster, S.W.
Clark, Latimer	1, Victoria-street, Westminster, S.W.
Corss, James	63, Shoreditch High-street, N.E.
Deane, Edward	1, Arthur-street East, London-bridge, E.C.
Figg, John Wilmin	1, Denmark-street, Soho, W.C.
Pierce, Charles	Boandices, Balham.
Pim, Captain Bedford, R.N.	Junior United Service Club, S.W.
Seager, General Edward	9, St. James's-street, S.W.
Shallis, John	11, St. Mark's-square, N.W.

AND AS HONORARY CORRESPONDING MEMBER.

Maurice, G.	Secretary of the Société d'Encouragement, 44, Rue Bonaparte, Paris.

The following Candidates were balloted for and duly elected members of the Society :—

Adley, Charles Coles	49, Hereford-road North, N.
Beaumont, Joseph	22, Parliament-street, S.W.
Mackenzie, John Henry	3, Dr. Johnson's-buildings, Temple, E.C.
Willans, John Wrigley	3, Bishopsgate-street Within, E.C.

The CHAIRMAN said the reason why he appeared before them as Chairman was that Mr. Grove, who was to have presided, had, at the last moment, sent a message to the Secretary stating that, having been five days in court in a heavy cause, he was so fatigued that he could not undertake the duties of Chairman this evening. He (Mr. Hawes) had, therefore, been asked to preside over the meeting.

The Paper read was—

ON SUBMARINE TELEGRAPHY.

BY THOMAS WEBSTER, M.A., F.R.S.

The responsibility of bringing this subject forward this evening having unexpectedly devolved upon me, I beg to tender my thanks to the Council for so promptly responding to the suggestion that the discussion on the subject of submarine telegraphy should be resumed. This room appears peculiarly fitted for a subject involving so many questions of physical science, practical knowledge, and commercial enterprise, questions which, taken in the aggregate, are beyond the scope of any of the many admi able societies of which this Society was the parent; and those who are acquainted with the way in which the Society has promoted and fostered the arts, will feel how fitting is the great social question of submarine telegraphy for the exercise and concentration of its energy and influence.

The paper of Mr. Masey has gone far to exhaust the history of the subject. On the present occasion it is proposed to direct attention to some practical considerations which lie at the basis of the successful solution of Atlantic telegraphy, as it would be matter of deep regret that another failure should take place, or even that another attempt should be made, until every precaution, suggested by past and present experience, should be taken to ensure the success of this noble enterprise. It would ill become us to disregard the warning conveyed in the concluding paragraph of the Report of the Commissioners, "that the failure of the existing submarine lines is due to causes which might have been guarded against had adequate preliminary investigation been made into the question."

This subject naturally resolves itself into the questions of the route, the cable, and the means of submersion.

Public attention has been directed to three routes across the Atlantic—the Central, the Northern, and the Southern, each presenting peculiar advantages and difficulties. The Central Atlantic, or the route from the West Coast of Ireland to Newfoundland, a distance of 1,700 geographical miles, was that to which attention was directed in 1856, as presenting a submarine plateau in the nature of a gently levelled plain, of a depth inaccessible to the anchors of vessels, and yet not so far depressed as to present serious difficulties in the submersion of the cable. The surface of the bottom of the ocean on the proposed route is said to be a portion of a great zone of table land, smoothly strewn with a deposit of shells as the sand of the sea-shore in a tranquil bay.

The history of the Atlantic cable laid on this route must ever be regarded with the deepest interest. That the cable should have been submerged and safely deposited on the bottom of the ocean, and have spoken at all, was a triumph of skill amounting almost to a miracle.

Since that great experiment much precise information has been attained as to the working, and the speed attainable in circuits of great length. It appears to have been ascertained that the rate of working a number of signals transmissible through two lines identical in every respect except as to length, is inversely as the square of the ratio of the lengths, that is to say, the speed of transmission, or number of words passed through a cable 600 miles in length, would be nine times as great as through a cable of 1,800 miles. This, which depends on a physical law of nature, is wholly independent of artificial and external conditions, as the insulation, which, however perfect, cannot affect the comparative results, and the shorter must always have a commercial advantage over the longer cable, which must necessarily influence the selection of routes. These and other considerations have called attention to two other routes for the Atlantic telegraph cable; one, the northern, from the west coast of Scotland, by the Faroe Islands, Iceland, and Greenland, to the east coast of Labrador, and the southern from the south coast of England, by the Canary and Cape Verd Islands to St. Paul, a small island in the South Atlantic Ocean, and thence by the Island of San Fernando to Brazil, and so along the coast of British Guiana and the West India Islands to America.

Both these routes present a convenient mode of dividing the distance into a series of short and manageable circuits, as in the case of the Government cable between Malta and Alexandria, which is divided into three, by the establishment of intermediate stations at Bengazi and Tripoli, and the cable in course of construction to connect India with Europe by way of the Persian Gulf. One main object of such division into separate circuits, is to ensure a high

speed of transmission, and one which may yield a profitable return upon the outlay; and this is of the greater importance at the commencement of such an undertaking, as it is stated that the actual numerically productive rate is not more than one-third of the highest attainable rate through a submarine cable.

The southern route, whatever its commercial or other advantages, has not as yet been adequately surveyed, and may, therefore, for the present, be dismissed.

The northern route presents the advantages of short circuits, and has been surveyed by Sir Leopold McClintock and Captain Allen Young, to a sufficient extent to enable a judgment to be formed on its suitability for the purpose, and, since 1860, the state of knowledge as regards the northern, is in almost the same position as the state of knowledge was in 1856 as regards the central route.

The northern route would present four sections of the following distances, according to the results of the survey above referred to, viz.:—

I.	Scotland to the Faroe Islands	225 miles.
II.	The Faroe Islands to Iceland	240 ,,
III.	Iceland to Greenland	670 ,,
IV.	Greenland to Labrador	510 ,,
	Total	1,645 miles.

The laying of the cable for these distances, and its submersion to the ascertained depths, will present no serious difficulties. The bottom of the ocean on the northern route is said to consist of shells, weeds, crustacea, with other animate and inanimate productions, presenting a favourable bed for the cable. The number of shore ends on this route, namely, eight at the least instead of two, presents a disadvantageous comparison with the central route, and is a subject for serious consideration in the selection of the route. The disadvantages of the northern route are the character of the region, in which the laying of any cable could go on only during a certain few months in the year, the icebergs and glaciers, and the volcanic character of the arctic regions. It must be borne in mind that the cable, when submerged, is at the bottom and not at the surface of the sea of those ice-incumbered regions, and that anchors, creepers, and trawl-nets, are more formidable enemies of a submerged cable than the floating iceberg, whose under surface is gradually diminishing under the more genial temperature of the lower strata of water. The submerged cable in the Northern Atlantic, would, in the opinion of the most experienced sailors, run little risk of damage from such causes, whether from the Arctic storms, however terrible, or from the clash and destruction of icebergs on the coast of Labrador in a winter's day, whatever may be feared from the volcanic and magnetic character, or from the aurora borealis of the region, or from the impossibility of repairing a damaged cable in the winter time between Iceland and Greenland or Greenland and Labrador.

The selection of the central or of the northern route must, as in other cases, be matter of compromise, after mature examination into all the circumstances of the case. An accurate knowledge of the bottom of the ocean is of the greatest importance to such a question, but even this knowledge may be bought too dear. Soundings in deep water, say from 1,500 to 3,000 fathoms, over a breadth of 4 or 5 miles, present serious difficulties, and would occasion a delay unfavourable to the success of the enterprise. Such lines of soundings, if attained, could not be kept during the submersion of a telegraph cable occupying many days and nights, during a considerable portion of which, in the fogs and the average weather of the Atlantic, no observations can be taken, while the speed of the vessel must frequently be so slow as to render her more than usually liable to get out of her course. A uniform level plateau, however desirable, is in no respect essential to the submerged cable, for the ridges and inequalities at the bottom of the ocean, in deep soundings, are not sharp knife edges likely to cut through a protected cable, which, in such places, is incomparably less liable to injury than a cable in shallow water, subject to abrasion on a rocky bottom, or to the action of anchors. The time is probably not far distant when cables will be laid on all of the three Atlantic routes, as well as on the Russian route, by Siberia and the Aleutian Islands, but in the inception of the important enterprise of the telegraph between Great Britain and the Western World, every energy should be concentrated on that route which affords the best prospect of the earliest and greatest commercial success.

The question of the cable is secondary to the selection of the route, as the weight, dimensions, and construction of the cable would in all probability be different for the central or northern Atlantic. The weights of some of the principal cables are as follows:—

Punard to Zandwort	11 tons per mile.
Boulogne to Folkestone	10 ,,
Orfordness to Haerlem	$9\frac{3}{4}$,,
Dover and Ostend; Frith of Forth; Corsica to Sardinia	8 ,,
Dover to Calais	7 ,,
Malta and Sicily	$3\frac{1}{2}$,,
Malta and Alexandria	$2\frac{1}{2}$,,
Red Sea	$1\frac{1}{4}$,,
Atlantic	$1\frac{1}{8}$,,

The heavy cables at the head of the above list are submerged in shallow water, and in situations for the most part liable to considerable risk from anchors and other interferences. The Atlantic cable is only about one-tenth the weight per mile of the heaviest of the above, and many persons of authority and experience in submarine telegraphy advocate a much lighter cable, one whose specific gravity shall not be greatly in excess of water.

The constructive submersion of the cable involves several important questions. Exception has been taken to the spiral laying of the outside or protecting wires of iron as having a tendency to throw the strain on the insulated conducting wire of copper, as well as to compress and displace the insulating material. The pressure of the water at great depths will have a tendency to compress and condense the insulating and other materials of the cable, but owing to the equality of pressure on all sides, there will be no tendency to displace that material as originally disposed in the cable, however great the compression or distention by the elongation of the cable, in reference to which, however, it must be borne in mind that the relative ductility of copper and iron is in favour of copper, so that the iron wires, unless the spire of the coil was considerable, would practically bear the strain.

The pressure and strain to which a cable may be subjected, and their effects on the insulating material, whether gutta-percha, india-rubber, or any of the compounds or products of modern science, may be ascertained by careful experiment and observation on land. Much may also be done in observing the effects of temperature on the insulating material under pressure, and the collective wisdom of men of science might do much towards arriving at a correct opinion as to the effects of magnetism and the aurora borealis on the submerged cable, and whether the effects would differ in kind from the disturbances which the telegraphic instruments experience during lightning and other electrical exhibitions, the laws of which, thanks to the labours of General Sabine and Admiral Fitzroy, are becoming gradually developed.

The laying and submerging of the cable involves geometrical and mechanical questions, which may also be reduced to certainty by experiment. The tendency of lines to twist, as observed in deep-sea soundings, is a source of difficulty in paying-out and submerging a telegraphic cable. The spirals of the cable afford an easy passage or line for the water, and, as the cable is paid out, the turns will accelerate; this prejudicial effect may be modified and corrected by care in the coiling and laying of the cable.

The character of the curve assumed by a cable, as laid in the water, will depend on the rate of its sinking and of its paying-out, that is, the rate of the ship. If the cable sinks faster than the speed of the ship, the concavity of the curve will be upwards or towards the surface of the water, and the convexity of the curve towards the bottom; but the cable in attaining this position will have presented a curve having a contrary flexure, in the language of geometricians, which, in a cable of great weight and thickness, may lead to se ious inconveniences.

If the cable should sink less rapidly than the speed of the vessel, the curve of the cable will be convex towards the surface, and concave towards the bottom of the water.

The motion of the vessel being necessarily irregular, those curves will become irregular, so that a portion of the cable may be deposited in coils or waves on the bottom of the ocean, and afterwards drawn together into what are technically called kinks, from which serious inconveniences have resulted.

The existence of such curves of contrary flexure are unavoidable in paying out a cable, whether lowered vertically or inclined, if the paying out is checked on board the ship, as it must inevitably be in laying a heavy cable. The consequences of the position assumed by the cable under a heavy sea may be very serious; so long as the cable lies away from the vessel in a position assumed by a chain cable when taut by a vessel at anchor, the vessel and cable will rise with the wave. But if the cable becomes vertical, inasmuch as a heavy body like a vertical rope, cannot be lifted vertically on a sudden jerk without an enormous strain. The rapid lifting of a vessel by the waves of the Atlantic may produce a strain which may injure or even break a cable so lifted; hence the necessity of having recourse to very elaborate machinery in the laying of the Atlantic and other heavy cables.

These and other difficulties connected with the submerging of heavy cables, have given rise to suggestions for making the cable as light as possible consistent with strength, and of a specific gravity but slightly in excess of water. Such a cable could be laid on the water from a vessel steaming at its full speed, a great length of cable lying nearly horizontally on the water, and sinking gradually at a slow rate, and adapting itself to the irregularities of the bottom. The cable would be subjected to a tension due to the velocity of the current of the water through which it was being submerged; the tension due to the weight may be disregarded in such a cable, whereas in a heavy one the tension is due to the weight, and the tension due to the current may be disregarded. In laying such a light cable, the tendency of the cable to run out or slip away from the vessel is so slight, that the elaborate regulating machinery required in laying a heavy cable for preventing the cable slipping away will be unnecessary, and may be dispensed with. Whatever may be the tension due to the action of the currents, either on a light or a heavy cable, the tension due to the weight of the latter must be superadded, and the tension from the action of the current on the enlarged surfaces of the heavy cable will not be inconsiderable, so that the total tension on a heavy cable is very serious amount.

Viewing the laying of the cable on theoretic principles, with reference to the action of the resisting forces, the light cable would appear to present so many advantages over the heavy cable, that the adoption of the latter in preference to the former will depend on other considerations, the result of actual experience.

The strain to which a cable is subject during the laying may be accurately determined by experiment and calculation, and this part of the question may be placed in the same category as the effects of temperature, of pressure, of extension, or of the comparative qualities of different insulating materials.

On the best construction of the cable, whether a combination of insulated copper wire laid centrically and spirally, protected by the iron wires laid straight, or nearly so, with hemp, asphalte, and similar materials, or other of the various combinations suggested; also, on the best system of insulation or insulators, whether gutta percha, or india rubber, or compounds thereof, or other substances now in existence, and already, or hereafter, to be applied, an inquiry conducted by competent persons may lead to the most important results.

In conclusion, I would suggest whether this Society may not be able to promote and facilitate such an inquiry, and materially to contribute to the solution of the question of the best system of telegraphic communication with the great American continent.

DISCUSSION.

The Chairman said, before the discussion commenced it might be well that he should place before them the exact position in which the question stood. They would recollect that a paper on this subject was read by Mr. Masey a fortnight ago, and in consequence of the great interest of the subject, and the great number of gentlemen who wished to speak upon it, it was understood that the discussion should be resumed as soon as the Council could find a fitting opportunity. By the kindness of the gentleman whose name had been put down to give a paper this evening they had been able to arrange for a renewal of the subject on which Mr. Webster had just read his paper by way of introduction. On the last occasion the discussion was chiefly directed to the mode of laying down the cable —he hoped this evening it would turn more upon other points. He begged to call upon Mr. Jenkin to open the discussion.

Mr. Fleeming Jenkin was very glad to hear from the Chairman that it was thought advisable that the discussion should embrace other topics than those which were touched upon at the last meeting. He thought it was necessary that some of the points adverted to in the paper of Mr. Masey, and in the subsequent discussion, should be treated by those who had had practical experience in these matters, which he (Mr. Jenkin) might lay some claim to. First, he would allude to the statement of Mr. Masey with regard to the arrest of the chemical action in cables laid at great depth in the sea, and their non-liability to decay. Upon that question he would say that experience showed them that they could not hope for quite such a favourable result. The almost total decay of the iron-wire covering was the cause of the failure of an attempt to repair a cable on which he (Mr. Jenkin) was engaged in the Mediterranean, and the wire at the depth of 1,200 fathoms was very much decayed, showing that oxidation of the metal had taken place at that great depth. He might add that on the same occasion he obtained evidence in corroboration of what Dr. Wallich had stated as to the existence of living animals at that great depth, which could not be the case unless chemical action was carried on. He had brought with him some of the eggs of a species of cephalopod; these were attached to a cable raised from depths of between 700 and 1,200 fathoms, and when the eggs were opened the embryo fish lived for a short time. That being the case, he was afraid they could not count upon any of the materials which were not permanent in shallow water being permanent in deep water; and, therefore, if iron wire were used for the cable, it must be protected against oxidation: if not, the cable would probably in time break up into short lengths. Reference was made at the former meeting to the spiral form of the wire covering. It was an almost universally received opinion on the part of the public that the spiral covering allowed the cable to stretch so as to injure the interior core, to a very great extent, as compared to what would be the case with a solid rod of iron. Now, considering it had been the universal practice of telegraph engineers ever since these cables were made—at any rate for shallow water, and in a great many instances for deep water—to use the spiral form of protection, he thought some doubt should have arisen in

the minds of those who advanced that statement, and it would have been well if they had tested their theoretical conclusions by actual experiment. He would refer on this point to the experiments which were printed in the Blue Book of the evidence received by the Board of Trade Committee, from which they would find that whereas half the breaking strain of a single wire caused an extension of from 0·15 to 0·18 per cent., a cable covered with these spiral wires was extended 0·3 per cent. with half its breaking strain, and that the breaking strain of a single wire caused an extension of from 0·4 to 0·5 per cent.; while the breaking strain of the cable caused an extension of 0·7 to 0·85 per cent., so that really there was no material difference between the two. The cable stretched only a small fractional per-centage more than the solid wire would do, and that was not mere theory, but had been proved hundreds of times by himself. The reason for this would be very apparent, when they looked at the matter a little more closely. If they took a single wire in the shape of a corkscrew it would elongate with a very small strain, because its diameter could diminish without experiencing any very sensible resistance; but when they put a series of corkscrews round a cable so that one butted against the other, the diameter of every one of those corkscrews could not diminish because they formed a complete arch of solid wire all round the cable. In order to diminish the arch, they must squeeze each wire flat, or at least oval, and the consequence was that the spiral covered cable, as regarded extension, acted almost like a solid rod. The form in which it was disposed presented a great resistance to pressure. The arched form of the wires prevented pressure coming upon the soft gutta-percha and hemp of the core, whether from longitudinal or casual strain, and made the most perfect protection against external injury which, in his opinion, had ever been devised. Nevertheless, he believed the interruption to the Atlantic cable had been ascribed to the proper causes, viz., the slight extension of the cable, and the separation and reclosing of the copper wires. The slight extension, though only a mere fractional part of the total length, would be sufficient to separate the copper wires if they had been previously broken, and to allow them to come into contact again when the strain was removed. It was well known that some joints had been carelessly made, and probably the failure occurred at one of these. He thought that was not likely to occur again. The copper wire was in seven parts, and had been carefully tested and inspected, but if, as was now most improbable, some break did exist through all the copper wires at one point, the same result of separating the wires at this break and allowing them to close after the strain was removed, would occur even if they had a solid steel tube round the cable; indeed, the solid steel tube would stretch more before it broke than the spiral cross covering, although it would bear a greater strain. He might mention that cables had been picked up from a depth of 1,500 fathoms, and the gutta-percha was found to be uninjured, and the iron wire not disturbed nor the diameter distended. The whole thing had been brought up in the same state as when it went down: therefore, to suppose that there was any practical objection to the spiral form of covering was, in his opinion, a fallacy, as had been shown by the many specimens which had come under his personal attention. Not only was the outer covering of the cable recovered from great depths free from defects, but the gutta-percha insulator was uninjured in the way which was stated on the last occasion. One speaker went so far as to assert that a pressure of two or three tons per square inch upon the gutta-percha for a few hours, caused it to absorb so much water that insulation was destroyed. There was not the slightest foundation for such an assertion. He had the strongest proofs to the contrary in the condition of the gutta-percha in cables he had picked up, after it had been submerged in great depths for three years. The insulation of the wire was perfect while at the bottom of the sea, and when it was picked up, the gutta-percha itself was as good as on the day on which it was sent out of the manufactory. The same fact was daily confirmed by the application of artificial pressure. To give them some idea of the perfection to which insulation by gutta-percha had been brought, he would state this fact. If 2,000 knots of a cable similar to the Malta and Alexandria cable were taken for the Atlantic, and the core maintained at 60 deg. temperature, out of every 100 parts of electrical current that was started, 97·85 would arrive at the further end of the 2,000 nautical miles of cable, which showed a loss of electricity of only a little more than 2 per cent. Under these conditions, in conformity with electrical laws, which he need not enter into, more current started than if the cable were absolutely perfectly insulated, so that if they compared the current (with a given leakage) which would arrive in America through such a cable as the Malta and Alexandria with that which would arrive through a cable with absolutely perfect insulation, the difference would only be 0·7 per cent. instead of 2·0 per cent., showing clearly that any further improvement in the insulating material was not required, and even if kept at a heat of 75 deg. Fahr., the difference would be inconsiderable. In the case of the old Red Sea cable, at 75 deg. 62 per cent. of the entering current would arrive at the end of 2,000 knots. These were not mere theoretical calculations, but were results which he had confirmed by actual experiment, when lengths as great as 2,000 knots were at his command, and he would add that it was well known that pressure improved instead of deteriorating the insulation by a small per-centage. With reference to the retardation of the signals, mention had been made of a limit in point of distance, beyond which it was suggested they might not be able to transmit signals. He would say there was no such limit. If they had a cable to the moon they could send signals through it; but through any one cable of given length and dimensions there was a limit to the number of distinct currents, and consequently to the number of distinct signals which could be sent through that cable, and that limit was, as Mr. Webster had stated, inversely as the square of the distance, and, therefore, *cæteris paribus*, short spans were desirable. Where a given ratio between the copper wire and the gutta percha was kept to, the number of words that could be sent per minute through any one length with any core was simply proportional to the quantity of materials used; so that, as it were, they got so many letters per pound of material employed. If they wanted ten words per minute, they must use twice as much material, both copper and gutta percha, as if they required to transmit five words per minute. The actual speed in words through every given length of cable was a matter on which all electricians differed a little—not as to the electrical laws themselves, but from the employment of instruments more or less efficient; but he was certain that a speed of transmission through 2,000 knots of cable could be obtained, which, if the cable were permanent, would return an excellent dividend for the outlay. With reference to light and heavy cables, the curves assumed by the cable while being laid, the strains which came upon every part of it, the strain which was necessary to lay it taut, and the loss which was sustained if it were laid with less strain—all these points were very ably treated in a paper by Messrs. Brooks and Longridge, read about three years ago before the Institution of Civil Engineers. The conclusions at which those gentlemen arrived upon theoretical grounds he had proved in practice to be correct. Their mathematical investigation was singularly complete and perfect, and he was surprised that very able paper had not been more often alluded to. The case against heavy iron cables, such as he had heard were proposed for the Atlantic company, was this, that in order to lay the cable along the bottom of the ocean without any very great loss, they must put on a strain in paying it out which was equal to the weight of the cable hanging vertically from the side of the ship to the bottom of the

sea, and in order to pay out the cable taut, such a strain was required, that for every thousand fathoms approximately they must put on a quarter of the breaking strain; so that in 2,000 fathoms they would have half the breaking strain; and if they diminished that strain only a very little, they lost a great deal of cable; so they had what engineers called a co-efficient of safety of only 2; and with a cable of great specific gravity they had the disadvantage that if they did not put on the full train necessary to lay the cable taut at the bottom, they very rapidly lost a large per-centage of the cable; so that, with a cable of the specific gravity of the old Atlantic cable, payed out in a depth of 2,000 fathoms, at the rate of $4\frac{3}{4}$ knots an hour, they lost 25 per cent. of cable if the strain were 3 per cent. too small, and 50 per cent. if the strain were 10 per cent. too small, according to Messrs. Brook and Longridge's tables. Now, with a cable of light specific gravity, even if it were of the same absolute weight and strength, they might diminish the strain 20 per cent. before they lost 25 per cent. of the cable, at the same speed; and if they went faster —say seven knots per hour—they might diminish the strain 70 per cent. before they lost 25 per cent. of cable. That to his mind was the real argument in favour of light cables. The great difficulty was to get a cable which should remain permanent when laid. He had no doubt before long the problem of a permanent cable in deep water would be solved. There were some other points which he might refer to, but he thought he had already occupied as much of the time of the meeting as he had any right to do.

Mr. Thomas Allan remarked that the first question to be decided in establishing a telegraphic communication between Great Britain and America was as to the cable itself; the route by which it should be laid was a matter which could be determined hereafter. What they wanted was, in the first instance, a cable that would meet the requirements of the case, suitable for being submerged in ocean depths without injury to its electric conductability. It was quite evident, as the result of all experience, that the cables hitherto constructed were only suitable for shallow waters, and not for ocean depths. What they required was a cable of light specific gravity, and that the combination of materials should be such that, in the laying there should be no injury to its working condition; also, that its bulk and weight should be such, that in case of necessity they might be able to recover long lengths of the cable. They knew that in the case of the Atlantic cable, with its comparatively small bulk and weight, it almost swamped the *Agamemnon*. In order to encourage them in this matter, there had been given, on a former occasion, a long list of cables successfully laid; but he had not seen a list of the failures. Cases were multiplied of the submerging of cables in shallow waters; but there was only one in existence which was really in ocean depths, and that only for a short distance, and within the last few weeks it had been found that that cable had followed the fate of its predecessors, which was an additional evidence of the inapplicability of those cables for such purposes. It broke in submerging; it was picked up and repaired; and that fact was sufficient to prove that there were errors in the principle of construction. The successes were certainly very great successes, much greater than could have been expected, because from the way in which the cables were constructed, they might have expected failure rather than success, and he looked upon them as "happy go lucky" successes. They must go to the great failure of the Atlantic cable to guide them for the future. Its unsuitability in point of conductive power was not the main question, which was simply a mechanical one—the doubt was, whether such a cable could ever be submerged to that great depth without destruction to its internal or electrical portion. On the last occasion they were told that the cable would never have spoken at all but for the ingenuity of the instruments prepared for the purpose, and that the signals were so slight that they could scarcely be recorded at the other end. It was clear to him that any other cable constructed on the same principles would equally fail in accomplishing the object sought. He had been informed that the new Atlantic cable was intended to be of extra weight and strength, but in proportion to the extra weight were the chances of elongation of the cable, and a similar destruction of the core to that which occurred in the former case. At the time the Atlantic cable was laid, he predicted that it would not work after it was submerged, and the *Times* expressed its opinion that although it might work temporarily, it would not answer permanently, from the principle on which it was constructed. Mr. Allan proceeded to describe the principles on which he had constructed a cable, in which the strength was placed where he contended it was most required—viz., in the centre, the outer covering being of light specific gravity. Upon that principle he contended that the electrical condition of the cable was best maintained, and by that means the probabilities of a permanent communication were greatly enhanced.

Mr. Walter Hancock said that, in conjunction with his father, he had devoted to the manufacture of gutta percha the nineteen years since its introduction into this country, and he would make a few remarks upon the important relationship in which gutta percha stood to the science of submarine telegraphy, in its present crisis and in its probable future. He would refer especially to matters of immense importance that had not had their due weight with electrical engineers when designing cables. It was notorious that they had committed great errors, which had resulted in costly failures. In round numbers, 10,000 miles of lost cable, worth £2,000,000 sterling, were lying at the bottom of the sea, and the startling fact that that portion of the resources of the country, instead of remaining in our hands in a productive form was lost to us for ever, confronted us, at once a monument of our past ignorance, and a beacon for our future guidance. Had we fully profited by the experience of the past? He feared not. The following vital points were still unsettled:—1st. The size, form, and construction of the conductors. 2nd. The insulating material we ought to adopt, and the quantity we ought to employ. 3rd. The form, nature, and specific gravity of the material to be used as an external protection. 4th. The all-important question of the just relation and proportion that should exist between these three essentials, conductor, insulator, and protector, in order to adapt them to particular situations, and particular depths. These questions, too often solved hitherto by predilection for some one particular theory, must in future be decided by the unerring oracle of scientific truth. It behoved us at this crisis in submarine telegraphy to take a comprehensive survey of the stupendousness of the work to be accomplished, and the comparative scantiness of the means that Providence had at present placed in our hands for its accomplishment. The work was nothing less than to establish the supremacy, the universal empire, of telegraphy over the entire globe. It was generally acknowledged that if we had at this moment 20 cables to America, 20 to Gibraltar, Malta and Alexandria, and from thence 10 to India, 5 to China, and 5 to Australia (and these would require about 200,000 miles of insulated wire), we could make constant use of the whole, provided only that they were economically constructed and worked, so that the tariff for messages might be moderate. He thought we could not afford to postpone for 50 years, or possibly for a century, the completion of these lines that were required for our service of to-day. But that this would be the inevitable consequence of pursuing the course that had been hitherto adopted was not a mere assertion, but a fact, demonstrable by the following statistics:—The average importation of raw gutta-percha for the last 10 years had been 750 tons per annum, and it was only maintainable at this rate by a gradual advance in price from 1s. to 2s. 3d. per pound. But of this quantity, 300 or 400 tons only were of a quality suf-

ficiently good for telegraphic purposes; an increase to 500 tons might be possible, with extraordinary exertions and a further advance in price. Now, if it were necessary that the cables referred to should be heavily insulated, for instance, with 550 lbs. of gutta-percha per mile, as it was to be feared that the Atlantic Telegraph Company (so far as they had given any indication of their views), would probably decide upon, should they be successful in raising the £600,000 they asked for, it would be obvious that the 200,000 miles referred to would require 50,000 tons of gutta-percha, and that it would require 100 years supply, at the 500 tons per annum, to produce this quantity. Or if we covered one-half of our cables with india-rubber, it would occupy 50 years. Unfortunately the supply of india-rubber stood in the same predicament; the average annual imports of the best, or Para, india-rubber being about 1,000 to 1,200 tons, nearly the whole of which was absorbed in the ordinary india-rubber manufactures of the country. These facts spoke eloquently to us all; they told the manufacturers of gutta-percha and india-rubber that they must economise the expenditure and increase the efficiency of their materials, they told the electrician that he must direct his attention to reducing the size of his conductor, so that the economy of insulating material may be fully carried out. An opinion prevailed, and he believed it to be well-founded, that it was not necessary to expend £600,000 in the construction and laying of a cable across the Atlantic. He considered that a good serviceable cable could be laid for £250,000, and that that amount might ultimately be reduced within £150,000 or £180,000. The necessity for economizing the gutta-percha was not a recently formed opinion; his evidence in the Blue Book published by the Government Committee appointed by the Board of Trade, would show that this subject had long engaged his attention. In proof that this economy was practicable, he stated that he insulated a wire with 105 lbs. of gutta-percha with four coats, and that upon repeated testings, side by side, after 12 months submersion, it was absolutely identical, both in its insulating power and in the smallness of its induction, with the wires so often referred to in the Blue Book as the 20-coat sample, which was insulated with 330 lbs. of gutta-percha. This sample cost £100 to £120 per mile, while his sample would cost £20 only. Referring briefly to the moot point of the value of intermediate compounds, and specially to that one known by the name of Chatterton's compound, he stated that too much reliance should not be placed upon them, because it was evident, from the rationale of their operation, that they improved insulation in inverse proportion to the otherwise defective state of the work upon which they were employed; and because they rendered the gutta-percha upon which they were employed more susceptible to the injurious effects of heat, either in warm climates or in the hold of a ship. With regard to cables for deep seas, he believed that we should ultimately come round to the adoption of hemp, the cause of which had been for many years very ably advocated by Captain Rowett. Those who advocated iron, opposed hemp on the ground that it would perish; but what was their practice? In Mr. Masey's paper it was stated, "It is now acknowledged by all connected with the science that the outside wire should be protected from corrosion by hemp and other substances." Now, if hemp was not able to take care of itself, how could it permanently protect the iron? The cables of the *Royal George*, after fifty years submersion, came up sound. The alleged tendency to decay might, in all probability, be arrested or prevented by a preservative solution. It would probably long survive any iron cable, and if it should ultimately perish he did not consider it of any great importance, because, for seas of extreme depth, he regarded an external cable as necessary principally to protect the core until it reached the bottom, and that, if the core once reached such a depth safely, and maintained its electrical efficiency for one month without diminution or variation, he believed that that core would remain safe and reliable until the cable had paid for itself. In conclusion, he would express unbounded confidence in the future of submarine telegraphy. Our failures had arisen from causes that were remediable; we must avoid them in future—renounce the predilection for any particular theory, economise our resources, and enlist the sympathy and co-operation of all who were willing to advance the cause. Then, and not till then, the triumph of submarine telegraphy would be assured. The wonders that it had achieved and was daily achieving, foretold the certainty of its triumph. Already it furnished in our morning journals the record of what had passed in all the capitals of Europe in the previous day; the day would come when, outstripping the sun, it would also record in the morning, not what the Emperor of China, or the Tycoon of Japan, proposed to do, but that which he had done in the previous afternoon.

Dr. Collyer said he was in the United States in 1857, and having then seen the nature of the telegraph the company were about to lay down, he wrote to them a letter, an extract from the reply to which he would read. He did so, he said, in order to show that he was not exactly a novice in the matter now under discussion. He had not only made experiments in telegraphy on a large scale, but he had been associated with gentlemen largely connected with the subject. The great point was to have a good conductor and a good insulator, and that the induction caused by the external wire now used to protect the conductor should be reduced as much as possible. In 1857 he proposed to the Atlantic Telegraph Company that a large core made of copper (a good conductor), say a quarter of an inch in diameter, should be employed, and that the strength of the cable should be in the centre. He believed that mechanically, as well as electrically, if that suggestion were looked at without prejudice, it would be found to be right, and that the proper place for the strength of the cable was in the centre. If the strength were external and not internal, there would be a breaking of the internal structure. At that time gutta-percha, not having been brought to such a state of purity as at present, was a great source of leakage, as far as the insulation was concerned. He proposed a large conductor of copper; and not a very large proportion of gutta-percha covering. One word with regard to the aurora borealis. In conversation with Dr. King, who went in search of Captain Franklin, he was told that the aurora was merely the effect of magnetic disturbance, not the cause, and therefore the objection that was raised, that the aurora would cause a disturbance in the cable, had no weight.

Mr. Cromwell F. Varley wished to correct a few erroneous notions which had got afloat. The first was as to the condition of the old Atlantic cable before it was laid. That cable during its manufacture was injured, to a great extent, by exposure to the sun. So much did it get heated at one of the manufactories, that the gutta percha was found oozing out through the external covering. All those portions that showed signs of imperfection were then cut out; but, necessarily, the eye could not detect all the places that were injured, and when that cable was put on board ship, and taken to sea, and then, not being laid, was taken to Keyham and put into a tank, it underwent many operations of testing and cutting out the defective parts, and he was told that many of the parts had not been put together carefully. More than that, recently he had seen many parts of that cable in which there were nothing more than bell-hangers' joints covered over with gutta percha. He (Mr. Varley) had made some inquiries from Professor Thompson as to the state of the cable before it was laid, and he had gathered from that gentleman's memoranda that a serious fault had been shown to exist not many miles from the end that was landed on the Irish coast. When the cable was made, it was not put under water; it was never placed in the element in which it was to operate until it was actually submerged. Consequently any defect in it could not at first show itself.

Still, defects manifested themselves in the cable. Although it was dry, defects showed themselves sufficiently to account for the non-success of the cable when laid. As to the thickness of the insulating material necessary for a deep sea, he believed it was very small. A piece of wire merely covered with gutta-percha had been tested in the usual manner with 500 cells of Daniel's battery, and it resisted the action for a very considerable period—in fact, it did not break down at all. He had frequently submitted gutta percha of the thickness of a thousandth of an inch to the same test, and successfully, for above twenty minutes. Sheet gutta percha, when made ten years ago, was comparatively opaque and porous, looking almost like calico, whilst now it was impermeable and transparent. Still there was a certain amount of porosity which required to be guarded against, and this could be done by covering the wire first with a layer of gutta percha, then with a non-conducting, soft, adhesive material, such as that known as Chatterton's compound, and then again with a layer of gutta percha, which would thus adhere to the first, and, by repeating this process, the defects in the insulation could be reduced to a minimum. It was stated that a cable thus covered had failed, but this was not the case, for a man on board the ship had been bribed to drive a nail into the rope, which, of course, destroyed it. It might be true, as Mr. Hancock had stated, that when the wires covered with Chatterton's compound were tested before being laid, against those covered simply with gutta-percha, the decision was in favour of the wire on which Chatterton's invention was not used. At the lower temperature, however, of the bottom of the sea, the decision was just the reverse. Last year he laid down a new wire covered with Chatterton's compound, and the insulating power of these wires was considerably greater than that of those not so treated. He would not enter into the dispute between gutta-percha and india-rubber. Gutta-percha had done good service, and experience did not warrant a change in the material to be employed. The insulation secured by the gutta-percha was more than sufficient for the transmission of messages across the Atlantic, and he therefore rested content with that material. To hear the observations which were constantly made, one would suppose that the Atlantic Telegraph Company desired to work in the most blundering way possible. This was not the case. The Atlantic Telegraph Company, during the lifetime of Robert Stephenson, had his name attached to their enterprise. Mr. Fairbairn was also among them, and he was sure he need not mention other names to warrant the assertion that the highest talent had been secured to assist the Company. A great deal had been said about the cable which the Atlantic Telegraph Company were going to lay, and although he must pay Mr. Jenkin the compliment of saying that he agreed with him in almost everything he had said, he, in speaking of the cable which the Atlantic Company was going to lay, had really gone beyond his knowledge, as no decision had been come to as to the kind of cable to be used.

Mr. JENKIN said he had spoken of the old cable, or had meant to do so.

Mr. VARLEY would say no more on that point. When the Sardinia and Bona submarine cable had been maliciously injured, and the wires were taken up, it was found that the insulation at the depth of 1,600 fathoms, after five years wear, was perfect. It was true that the Algiers telegraph was out of order, but that was not in deep water, but near the shore. The cable from Spezzia to Corsica, laid in 1854, was at this moment in perfect working order, and had never cost a farthing for repairs. It had been said that tension of the wire spoiled insulation. Now he had frequently had to deal with wires that had been very considerably stretched, and he remembered that when a portion of the Metropolitan Railway gave way between King's-cross and Euston-square, the telegraphic wires went down several feet without destroying the insulation, although it was afterwards ascertained that the tension had been so great that it was necessary to cut out four or five yards of the wire.

Mr. HUXLEY said there was a point of view in which the question must be considered, but which was escaping the notice of the meeting. Although a great deal of learning had been displayed as to insulation and induction, the great question in the mind of the public was the expense. To him three points, three principles, seemed to be settled—one, that a cable should have perfect insulation; next, that the outer covering should not be subject to injuries from external sources; and thirdly, that the cable should be flexible, without liability to be broken or kinked. The issue came to this:—whether metallic coverings were proper for the purpose. Whether they could be made so light as to fulfil the necessary conditions was questionable; if that could be done then one difficulty was solved, and this would go further, in his opinion, to settle the matter than anything else. It seemed, however, to many, that iron or steel coverings would not satisfactorily fulfil the conditions. There were exquisite specimens on the table of that covering and of other coverings, but he thought they should consider whether it could not be proved that iron was not suited to the purpose. On the table there was a specimen of an exceedingly light cable, covered with rattan cane. It could be made of any degree of weight necessary to submerge it, and it appeared that the covering of silex was absolutely impervious to the sea, impervious to insects, and would wear for any length of time. He thought this, then, fulfilled many of the requisite conditions. It did not heat under any circumstances, and its indestructibility was familiar to us all.

The Right Hon. J. STUART WORTLEY desired to tender his thanks to the Council of the Society for their courtesy in permitting him to be present, and to take part in this interesting discussion. But he was perfectly conscious that that courtesy had been extended to him, not on any personal ground, but on the ground of his position as chairman of the Atlantic Telegraph Company. At the time of its failure, he had no connexion with that Company beyond the embarkation in it of a moderate amount of capital, to which he was tempted by the grandeur and the great prospects of the undertaking, not in a commercial sense, but in a national and general sense, as one of the greatest undertakings conceived by the mind of man. His object in presenting himself was to remove misconceptions, and the principal error he wished to correct was this:—it had been stated that the Atlantic Telegraph Company had determined to do this and had settled to do that. Now he might, as Chairman of that Company, expose himself to ridicule, if he said they had settled nothing; still he was prepared to believe that, in taking that course, they had taken a truly scientific and wise course. Hitherto they had been without sufficient information. Numerous experiments had been made, by which a great deal of light had been thrown on the subject, and he took some little credit on himself for having suggested to the Government the appointment of a commission, and having suggested to that commission the taking of evidence by word of mouth instead of by written papers, the consequence of which had been the collection of an amount of information which, if properly used, would be productive of immense benefit. This information had not only been circulated in England, but in France, for he had seen in the *Revue des Deux Mondes* an article in which the contents of the Telegraph Blue-book were fairly and fearlessly discussed, and it was admitted that a great step had been taken in the science of sub-marine telegraphy; and while credit was given to the company for being the first to imagine the possibility of achieving their great work, the *Revue* went on generously to say, the faults were not theirs, for that in those times they had not the lights which had since been obtained. One gentleman had spoken of the cable the Atlantic Telegraph Company was going to lay. It turned out that he meant to refer only to that which they

had laid. But then, why speak of a cable of heavy iron, that could not support itself? Another gentleman spoke of the immense quantity of gutta-percha the Company were going to waste, by throwing it to the bottom of the Atlantic, but he would ask where they learned either the form of the cable the Atlantic Company were going to lay down, or the amount of gutta percha they were going to send to the bottom of the sea? The fact was, the Company had decided nothing. They had obtained the best information, they were making experiment after experiment, but till the result of those experiments had been submitted to the judgment of scientific and practical men, and their opinion had been obtained, the Company would not decide what should be the form of the cable, or what would be the substance of which it would be composed. The Company had obtained the assistance of Mr. Fairbairn, upon whom the mantle of the two Stephensons seemed to have descended; of Professor Wheatstone, avowedly at the head of electric science in this country; of Professor Thompson, of Glasgow, and in their own service of Mr. Varley, who had addressed the meeting to-night. These gentlemen would investigate the various schemes and the prospects which they held out, and when they had formed their judgment, the Company would carefully weigh their recommendations. It had been represented that the Company had entered into a contract with a monopolizing firm, and had bound themselves hand and foot. But this was altogether untrue. The company were free to make contracts with any one. They were bound to no form of cable, to no mode of manipulation. Whatever its faults, the company had not rushed into the enterprise without due deliberation. They had kept their hands free from prejudice and from all commercial and other restrictions. Allusions had been made to the failure on a former occasion. Mr. Varley had, he thought, sufficiently accounted for that: but it was well known that, so far from that failure being a matter of astonishment, it was a miracle, indeed, that the cable ever spoke at all. Those who projected it knew little of the subject; those who manufactured it were without experience; there was not time for the work; the manufacturers of the two portions failed in making the twist in both in the same direction. A high authority, who saw the cable at Liverpool before it was shipped, pronounced it impossible that it could ever be of any use. They were, however, far from being discouraged by their first failure. The *Reuve des Deux Mondes* allowed that the Atlantic cable had failed, but it added that it had established the fact that the electric current could be transmitted through long lengths, and that the failure was wholly owing to surmountable difficulties. In point of fact, he believed the general opinion to be, that so far from deep water being an impediment or a source of failure, the deeper the water the safer would be the cable, and the farther removed from accident. The greater number of failures of electric cables had, in fact, been in shallow water. It had been said that there was only one telegraph at work in deep water, and the Algiers cable, in 1,600 fathoms, was referred to, but the cable communicating between Toulon and Minorca, which included deep water, was perfect at that moment. The Company were anxious to obtain all the information in their power before again attempting so great an enterprise.

Mr. Hancock expressed his pleasure at hearing that the Company were not bound to any particular form of wire, or to any particular mode of insulation.

Mr. Jenkin explained that he might have been in error in using the term "new Atlantic cable," but his calculations were all based on numbers from Brook and Longridge's paper on the old Atlantic cable.

Mr. C. W. Siemens was of opinion that discussions like these did a great deal to spread a perfect knowledge of matters connected with so vast an undertaking as the Atlantic cable. There was no doubt that a light cable could be made to speak. It was a question for the shareholders how quick they wished it to speak, and then it was a question what quantity of material could speak the best. With regard to the outer coating of the cable, he thought that most important. Electricians knew pretty well what could be done with a given material, and there might be different plans of putting it on. Some might be in favour of one material and some of another; and they knew that with a given quantity of gutta-percha or india-rubber they could obtain insulation, but in deep-sea cables the quantity of outer covering was of great consequence. It was most generally admitted that a heavy cable was not suited for deep waters; and it was also admitted that a sheathing of some sort was necessary in order to protect the insulated conductor, not only in trans-shipment and paying out the cable, but afterwards in protecting it against the inroads of marine animals, or the accidental strains to which it might be exposed in lying on a rough bottom. As to what the best form of covering might be, he supposed the meeting would not agree, because, like most problems, after it had been plainly stated it might be solved in various ways. and most of those who were professionally engaged in those matters would form a rather strong opinion in favour of one form or another. But in meetings like this opinions were brought together, and he hoped to see the great enterprise of the Atlantic cable accomplished by one or various modes. He thought there was plenty of room for two Atlantic cables at least, probably for more. Before he sat down he would only remark that there seemed to be much misapprehension respecting the effects of earth currents upon the working of submarine telegraphs. It would appear, from Mr. Varley's observations on the former occasion, that the disturbing influence of these currents was very great, whereas, in point of fact, they were of no practical importance. The earth was no doubt a powerful magnet, as was proved by the appearance of the magnetic light at the polar surfaces, but no current would result from the terrestrial magnetism, except at the time of any change occurring in its intensity, and it was well known that these changes took place only very gradually. In making the necessary arrangements for the working of the Malta and Alexandria line, he had made no provision against earth currents, and the fact that the battery power in working this line had been limited to eight cells was the best proof that no such provision was necessary.

Mr. T. A. Masey wished to say a very few words with reference to what had fallen from Mr. Jenkin relative to the strength of the outer covering of cables. The shore ends of the Dieppe cable formed a perfect cylinder, and were capable of bearing almost any pressure that could be brought upon them. In the shipping of that cable at the East India Docks, it was carried across the roadway, and one of Pickford's vans, heavily loaded with pig iron, passed over it, scarcely making an indentation in it. With regard to the Atlantic cable, he held in his hand a specimen which had been laid in about 2,000 fathoms, and it was found that although the wire covering had been strained to such an extent as to lay bare the gutta-percha, yet the insulation of the copper wires was good, and quite sufficient for conducting electricity through them. If that was a sample of what had taken place at such a depth, it was a proof that the iron covering did not give the support that was intended, and answered no good purpose beyond giving strength in the laying down of the cable.

Rear Admiral Sir Edward Belcher, said, as it was impossible to arrive at a satisfactory conclusion from the discussion which had taken place, he would suggest that the Council of the Society be requested to appoint a committee for the purpose of prosecuting further inquiries into the subject.

Mr. Owen Rowland said, he had been engaged by her Majesty's government under the Board of Trade, in conducting very extensive experiments in the testing of cables for sub-marine purposes. They had all heard of those experiments, but they had no idea of the great ex-

tent of them, or of the time and labour that had been bestowed upon the testing of the best materials for submarine cables. Those experiments were in part published in the blue-book, but they were not all recorded there. He was glad this subject had been taken up by the Society of Arts, because he believed the discussion of it would tend to increased confidence in the practicability of submarine telegraphy; and if the Atlantic Telegraph Company acted upon the information and instruction given in the report of the government commissioners they might confidently look forward to the time when a permanent telegraphic communication with America would be an accomplished fact, to the mutual benefit of both countries.

The CHAIRMAN said it was now his duty to close the discussion for this evening. With regard to the proposition of Sir Edward Belcher, that a committee should be appointed by the Society to conduct inquiry into this very important subject, he might state that the Council had already appointed a committee to inquire into the destructibility of gutta-percha and the best mode of its employment, but that committee had ceased its labours since the appointment of the government commission. Whether the Council might think the present a good opportunity to appoint another committee to inquire not only into gutta-percha, but into submarine telegraphy generally, he could not say, but the recommendation of Sir Edward Belcher would be laid before the Council, and would have their best consideration. His present duty was to propose a vote of thanks to Mr. Webster, not only for his paper, but also for the kind manner in which he had stepped in to introduce the discussion this evening. He had had the good fortune to bring them to this point—that whereas, on the last occasion they mainly discussed the channel of communication, they had this evening discussed the mode of the communication. The question now arose as to what was the proper quantity of insulating material to use, and what was the best material for that purpose; and when they had settled that question they had to decide which was the cheapest and best mode of laying down the cable. These were difficulties which no one could doubt the energy and enterprise of this country would overcome, because, in the words of their late Royal President, if a body of Englishmen said they would succeed, their energy and indomitable courage never failed in accomplishing success. They might, therefore, hope in a short time to enjoy the great blessing of telegraphic communication with their trans-Atlantic brethren as quickly as they could now do with their friends all over England and on the continent of Europe.

The vote of thanks having been passed,

Mr. WEBSTER said it gave him great pleasure if he had been of service in bringing before them an object of national importance, as he considered this to be. Having on a previous occasion taken upon himself to suggest the resumption of the subject, he would add one word with reference to the proposition of Sir Edward Belcher and the observations of the chairman upon it. It was clear that the matter of the Atlantic Telegraph was now reduced to comparatively narrow limits, consisting merely in matters of detail, and he could not conceive that this society could do itself greater credit than in giving the use of their rooms for the discussion of this subject.

The Secretary announced that on Wednesday evening next, the 18th February, a paper by Mr. A. Nesbitt Shaw, "On the best means for Promoting the Growth and Improving the Quality of Cotton in India," would be read.

The following communication has been received by the Secretary since the meeting:—

SIR,—I was too sensible of the courtesy of the Council of the Society of Arts, in allowing me to be present and take a part in their discussion, to encroach upon their time by prolonging my observations last night; otherwise there were two topics upon which I should have wished to add only a few sentences. First, with regard to the route for an Atlantic cable, and, secondly, on the subject of the surveys already made of the bottom of that ocean.

With respect to the first of these points, however, my object would not have been to depreciate the efforts of others in any direction, but to justify our company in their deliberate adhesion to their original line from Ireland to Newfoundland, from a conviction, founded on careful and wide inquiry, that it is the best if not the only certainly practicable line, as well as the one of which (subject to certain conditions on success, to which they have been justly subjected by the government for the protection of the public) they are in exclusive possession against all the world. Their line has been proved by experiment to be practicable, and we think it wise not to depart from this already trodden track, though modifications at the termini and landing-places may probably be admitted.

With respect to the surveys, it appears to have been forgotten or ignored, in former discussions, that two fresh and careful surveys were made, at my request, in the course of last summer, on each side of the Atlantic, by soundings at short intervals, for several hundred miles seaward from each coast, by officers and ships of her Majesty's navy, and with the happy results of proving that the descent into great depths, on the Irish side, is not by a "precipice," as some have conjectured, but by an easy and gradual incline; that the bottom is not rocky or infested by insects, but tranquil and undisturbed by currents, and consisting of "ooze" and soft and favourable material, calculated to protect rather than injure a cable lying upon or imbedded in it.

There may be points of rock undiscovered "no bigger than the President's chair," as suggested on one occasion, but the gravel bottom in the great depths has been ascertained to be, if not an absolute "plateau," as supposed by Maury, at least of a generally equable and plain surface.

I am, &c.,

J. STUART WORTLEY.

Feb. 12, 1863.

AWARDS OF MERIT AT INTERNATIONAL EXHIBITIONS.

(*Continued from page* 196.)

In August last the Council of the Society of Arts issued a letter, inviting the opinion of the Jurors, the Commissioners for the Colonies and for Foreign countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and requesting replies to the questions given below, with the intention of embodying the answers in a public report.

AWARDS OF JURIES.

1.—Are you of opinion that Awards for Merit, by medals or otherwise, in International Exhibitions, are desirable?

2.—State the reasons for your opinion.

3.—Ought Works of Fine Art and Designs to be excluded from the awards?

4.—Can you suggest any better method than the appointment of jurors for making the awards?

5.—Can you suggest any improvement in the constitution or proceedings of the juries?

6.—Is any appeal from the decision of the juries desirable?

7.—If you think awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?

8.—Have you any further suggestions to offer on the subject?

The following is a summary of the replies received. The figures attached to the replies correspond with those of the questions:—

JAMES PULHAM, Exhibitor, Class XC.—1. Yes; if objects are well examined by competent persons and sufficient time is given to compare the various works, there should be awards by juries of gentlemen well known for their judgment or refined taste, not manufacturers or tradesmen. 2. With an award in proportion to the merit, the exhibitor is more likely to become known, and the public benefited, than if left to the uncertain judgment of the press, who sometimes exaggerate their statements, though this originates with the exhibitor. In some things the public may judge for themselves, but are likely to be influenced by puffing advertisements of men of capital, while the more quiet man is unknown, especially so as cheapness is the order of the day, regardless of the quality. Necessary, too, for the quality of some things to be tested, by competent persons, which the public cannot do to advantage, hence the necessity of an impartial award. 3. No; for similar and further reasons, viz., the public are not sufficiently educated in art to distinguish and appreciate deserving works. 4. No. 5. Yes. Suggests that those chosen for jurors, and accepting the duties, should devote sufficient time, and not work hastily, and omit scattered objects. Jurors should be well known for their judgment and refined taste, not manufacturers. 6. Appeal is necessary as omissions and mistakes will happen. 8. There should be no duplicates exhibited, nor should merchants and dealers exhibit the same kind of objects as the manufacturers, as it is taking up room to the exclusion of deserving works, increasing the expense, and making persons of understanding annoyed to find it so shop-like. It has been proved to be necessary, both in 1851 and 1862, to exclude some of the very inferior works sent by persons knowing no better. All works should be remarkable for some peculiarity, or perfection, utility, and good taste, and this might be understood as one mark of honour to be accepted equal to honourable mention. If there are medals there should be two distinctions, but awards on parchment are sufficient, stating the degree of excellence of the principal objects of each exhibitor. To those who are not rewarded, a statement of objections should be made, that they may see they are not unintentionally wronged or omitted. He will not be so uncharitable as to think any wilful neglect or wrong will or has taken place.

SAMUEL SUGDEN (Messrs. Sugden, Son, and Nephew), Exhibitor, Class XXVB.—1. No. 2. Because in some instances merit is so equal that the most meritorious may not always be rewarded, in consequence of trade prejudice with the jurors, it being almost impossible to constitute a satisfactory jury, divided into sections of classes composed of four or five jurors, who have four or five various kinds of goods to judge; the decision will sometimes rest with only one of them, the remainder having but little knowledge, or being quite ignorant, of the subject. 3. No. 4. No. 5. No. 6. Yes; but only in case of deception or fraud by exhibitors. For instance, if British exhibitors, who did not excel in the manufacture of their articles, went to foreign countries to provide themselves with superior goods, and exhibited them as their own and as British manufacture, it is a fraud on their part; and whether the discovery is made before or after the awards are given by the jury (if proved), it should disqualify them from receiving any award for merit. 7. Do away with medals, and grant an award of honourable mention to all cases of merit, omitting only bad and indifferent.

JOHN SUTHERLAND, M.D., President of Class XB.—1. Awards for merit necessary. 2. If no authorised awards there would still be awards of some kind, in the way of notices through the press, the authors of which, however honest in intention, might have neither the requisite knowledge nor experience to guide them. Public awards are very highly prized in foreign countries, and it is doubtful if the same amount of interest would be taken in international exhibitions, if no other result than the exhibitor sending his objects, putting his name on them, and taking them away. Public rewards are an acknowledged form of recompense all over Europe, and even learned societies not above their influence. There is therefore custom in their favour. 3. Works of fine art and designs of all kinds should be excluded from awards, or rather should not be included for awards. True works of art are above all competition. They ought to be in advance of all popular taste; they should lead it, model it, and educate it. They require no one to point out their excellence, not even critics. Their influence is peculiar. Besides, the true artist is above all desire of reward, from the mere fact of his being a true artist. As to designs, they should be excluded, because exhibitions should encourage only tangible results, not proposals on paper. There would be endless inconveniences in making awards for the design, unless the design were embodied in a finished work. For example, if a silversmith produced a sculptured vase worthy of award, there should be an award for the designer also, and so of other products. 4. No way in which awards could be so satisfactorily made as by competent juries. But the appointment of competent juries infers necessarily that the objects submitted to them are within their competence; in other words, that there should be a proper classification of objects. On this point the present Exhibition is defective. Considers a proper classification, to enable the right men and the right objects to be brought together, as the very central point of all such exhibitions. Again, there are numerous objects in the present Exhibition which have been adjudicated on without the chance even of the juries arriving at a true knowledge of their merits, and yet the necessity of obtaining such knowledge is admitted in other cases. For example, wines and articles of food, have been tried and adjudicated on after trial. Machines are examined while in action, musical instruments are tried; but as soon as we arrive at domestic appliances for warming or cooking, there is no longer a trial. Juries have nothing to guide them except external appearance, and hence real improvements are overlooked, and awards given in reality merely for the design. In dealing with objects of this kind—and they are very numerous in the Exhibition—a choice might be given to exhibitors to exhibit either with or without trial, but to give special awards only to objects which have been tried. There are many objects of familiar use in which such trial would not be necessary, and in which improvements would speak for themselves, but there are others where trials should be made, and no doubt the different commissions would provide the means of doing so. Our own manufacturers would do this for themselves. 5. Not an easy matter to constitute a jury in all respects satisfactory. Suggests with diffidence that the qualifications required in jurors are common sense, fairness, and competent technical knowledge. Not quite sure that practical acquaintance with the objects as a manufacturer or dealer is an advantage in a juror. Difficult for a man to keep his judgment unbiassed where he has to give an award to any thing, however excellent, in his own trade, which he deals in or makes, or especially if he sees that the object is better than his own; and yet the opinion of such a man would be of great service in helping the jury to a fair decision. Feels disposed to select small juries of good and influential names with the qualities required. By having few jurors their individual responsibility is increased, and would select experts to be attached permanently to each class, who should have sufficient knowledge to appreciate the qualities of all the objects in

the class. These experts should be the advisers or witnesses of the jurors, but without a vote. The responsibility of the vote should lie solely with the jurors. On this plan, each class would have its jurors and experts. The experts might be manufacturers, dealers, or any persons practically conversant with the objects. At present, experts can be called in, but this is not enough, they should be permanently attached to the classes. 6. With such an arrangement there would be little need of appeal from decisions of prizes, but perfect fairness to exhibitors requires that there should be an appeal. It could be done as follows:—On a certain day, after the opening of the Exhibition, the awards for each class should be printed separately, and circulated among all the exhibitors of the class, and a certain day should be fixed, before which appeals should be sent in to the Council of Chairmen. These appeals should be on three points. 1st. Absence of notice of an object. 2nd. The award being on a lower scale than the exhibitor anticipated. 3rd. The reasons of the award not being satisfactory to the exhibitor (some important points of his invention overlooked). The Council of Chairmen could dispose of many of the appeals at once, but in cases of doubt, the jury which made the award should be required to state its reasons:—*a.* Why an invention was not noticed? *b.* Why a higher award was not given? *c.* Why the points raised by the inventor as to the reasons of the award are not worthy of attention? (Or else the jury should declare itself further enlightened, and amend the award). The decision should then be given by the Council of Chairmen, and should be either affirmative or negative simply. 7. The present system of recompenses is not all that is desirable. What one longs to see is a better acknowledgment of the "workman" in these awards. One would like to know who the Titans were who made those great marine engines; or whose fingers pencilled the exquisite porcelain paintings which are among the glories of the Exhibition. There must have been designers and chasers, or rather, sculptors of great merit, of all that jewellery and silver modelling which everybody so admires. Some of it is stamped with the very highest marks of art, and yet there is recompense only to the man who pays wages. One would wish to see a more direct connection between the workman who has this exquisite artistic gift and the public which admires it than merely money wages. In the present Exhibition the patentee and the master manufacturer have put their claim successfully forward as against the seller, and justly; but the designer and workman have, to say the least of it, as high a claim to public acknowledgment as either. Would encourage the payer of wages, whose enterprise calls forth so much excellence, as at present, for he fully deserves it, but would try to call forth and encourage all the genius and all the power which lies beneath. It would benefit all parties to do so. The difficulty is how to do it. The first award would be made to the exhibitor, but, in doing this, he might be required to give such particulars in regard to the design and execution to the jury, on their demand, as would enable them to reward the working element. The exhibitor would become an expert to this extent. The mere honourable mention of names of successful workmen would have great effect with the working classes, for it would bring merit of this kind prominently forward, and enhance its value; and to this might be added, in special cases, a medal or other award, which might descend as an heirloom in the family. 8. If it were practicable, should feel disposed to go even further, and to give one special distinction in each class to that exhibitor who, all things considered, was the best in the class—a sort of European industrial distinction, similar to the grant of the Legion of Honour which is given in France for similar purposes. The experience of the present Exhibition appears to indicate that some permanent place of exhibition and sale, where the public might see all that is good in the manufacture of foreign countries and of our own, and might effect purchases on the spot, would be a great additional spur to improvement.

THE ROYAL SWEDISH CENTRAL COMMITTEE for the International Exhibition of 1862, in a report signed by W. TROILUS, Vice-President; K. Styffe, Juror, Class I.; Carl Palmstedt, Juror, Class XXI; Carl Heinemann; J. Danefelt, Juror, Class IX.; J. Bolinder, and E. A. Höckert, says that having had laid before it by the Swedish Commissioner in London, the questions proposed in reference to the advisability of distributing medals and other distinctions in connection with future international exhibitions, it submits, in reply, the following proposals:—1. The Royal Committee considers that medals and other distinctions, in connection with international exhibitions, are adapted to promote the desired result. 2. The Royal Committee bases the above opinion chiefly on the fact that the direct pecuniary advantages that may possibly be gained by manufacturers from participation, often at great cost, in international exhibitions, usually only fall to the lot of the minority of the exhibitors; that such advantages are mostly attained first after examination and approbation, by qualified persons, of the value and superiority of the articles exhibited, and, consequently, that the mere exhibition, or the anticipated possible sale of the goods of each separate exhibitor, is not a sufficient incentive to the private manufacturer to make those sacrifices of time, labour, and money, necessarily connected with participation in international exhibitions in far distant places, unless, in addition to the purely material advantages, attention be also paid to the praiseworthy desire of each individual to gain distinction and honour both for himself and his country, through the public recognition of the value of his exhibited articles by qualified and impartial men. It appears, also, to the Royal Committee, beyond all doubt, that many exhibitors would not come forward, if the personal distinction conferred by the granting of a medal were withheld. Experience, too, proves the value which manufacturers attach to a medal in the zeal with which this distinction is sought for and employed as a means of recommendation. 3. The Royal Committee considers that distinctions should also be conferred for articles belonging to the fine arts, when the international exhibition of such articles is connected with the exhibition of works of industry; and that such distinctions, as well as those for works of industry, should comprise several degrees, denoting several degrees of merit in different works of art. This opinion is based on the fact that the artist, as well as the manufacturer, needs to be advantageously known and employed as a superior producer, for which reason he, too, to a certain extent, should be measured by the same guage. It is doubtless true that the artist has in addition to the above motive a purely ideal aim, that does not generally, at least in the same degree, inspire the manufacturer, namely, the honour of a renowned artistic name, often striven for with the greatest self-denial, and the most persevering labour. It is natural that this honour should seek confirmation by a pledge of recognition striven for and won in a competition with the artists of the whole world at a general exhibition, and conferred by judges of art from the most cultivated countries, in the presence of the representatives of all the people of the earth. Such a recognition is not only a powerful incentive to him on whom it is bestowed to continued exertions in order to hold and improve the honourable position attained, but it is also a noble goal towards which those may look who, with young and vigorous energies, enter the often thorny paths of art, and which, whether more nearly or more distantly approached, will encourage many a hopeful and enliven many a sinking heart. 4. The Royal Committee cannot propose any better means for the adjudication of articles exhibited, and the awarding of distinctions, than juries composed of qualified persons from all the countries that have contributed to the exhibition. 5. The Royal Committee considers that the following modifications in the rules adopted at the exhibition of this year, for the construction of juries and the division of their labours, would produce

important advantages:—*a*. That the Commissioners of the country in which the exhibition is held determine the division of the exhibited articles into classes and sections; the number of the international juries according to that division; and the manner in which the members of the juries shall be elected; and, also, announce the time at which such juries shall commence their labours; but that they leave the election of the chairmen and vice-chairmen to the jurors themselves, to be decided at the first meeting of each jury. That the chairmen, vice-chairmen, and secretaries of the several juries form a separate board, to which a special secretary-general be appointed by the Commissioners above mentioned. *b*. That the Commissioners appoint a paid secretary to each class and section. That it be the duty of such secretary, immediately after the opening of the exhibition, and before the juries be convened, to receive, each for his class or section, from the representatives of the several countries at the exhibition, and from the exhibitors themselves, communications and information in reference to the articles exhibited, and also to keep the minutes of proceedings at the meetings of the juries, and to draw up the final report. *c*. That the juries be not convened before the whole exhibition be completely arranged, and that in determining the time, allowance be made for these countries, which, in consequence of peculiar climate, are prevented, in any year, from having their divisions completely arranged before the middle or the end of May. *d*. That instructions be given that a special catalogue for the exhibition of each country, together with the official catalogue, be, if possible, ready before the juries be convened and commence their adjudication. *e*. That, after the completion of its labours, each jury submit to the board of chairmen a complete list of the prizes proposed for its class, accompanied by a report stating the ground upon which such prizes have been awarded, and a description of the qualities, advantages, and appliances of the exhibited articles so distinguished. The Royal Committee does not consider it advisable, and, at the same time, it is attended with great difficulty, to establish any superior tribunal to which exhibitors might appeal from the award of the juries. 7. The Royal Committee, while, as stated before, it considers a system of prizes to be absolutely necessary in order to induce a more general participation in exhibitions combining all branches of industry, yet believes that a system comprising distinctions of different degrees, denoting the greater or less importance to civilisation of an invention or discovery, an improved method of working, a perfection in quality or appliance, and an increased production of necessaries, combined with a reduction in price, to be preferable to that adopted at the international exhibition of the present year, by which only one medal was awarded, and the subsequent distinction of "honourable mention" conferred at the recommendation of the juries. The Royal Committee certainly considers the favourable judgment of an impartial jury on an exhibited article, supported by the motives on which that judgment is based, to be the highest and most valuable distinction, and that no distinction should be granted without the reason for its award being stated and published; but at the same time the Committee believes that such a publication, whether it be by tickets attached to the articles rewarded, or by printed lists, is not sufficient to attract that degree of attention on the part of the public which the exhibitor must desire, but that in addition to this, a tangible sign is requisite, and that for such a purpose medals certainly are best adapted. At the same time, for the reasons already stated, and as the judgment of juries on the merits of articles of different character must always, to a certain extent, follow a graduated scale, it appears desirable that these signs of the distinctions awarded should also consist of several degrees. 8. The Royal Committee here repeats the opinion before expressed with respect to the season of the year at which international exhibitions should, at the latest, be held, with a view to the commencement of the labours of the juries, viz., that this, in reference at least to the northern countries, should not be fixed earlier than the beginning of June. At the same time it should be definitely announced that no article will come under the adjudication of the juries that arrives at the exhibition later than the time so determined. The Royal Committee considers it of especial importance that international exhibitions, comprehending all branches of industry, such as the three already held in the years 1851, 1855, and 1862, be not repeated too often, and, by preference, not more frequently than every eighth or tenth year. If they recur at shorter intervals it is to be feared that the great expense connected therewith, both for governments and for private manufacturers, would discourage a numerous and varied participation therein, and, also, that by becoming monotonous they would lose their interest to the public, as the genius and industry of man do not so hastily develope their results, unless in exceptional cases, any very decisive progress in a shorter period can be observed. Under all the circumstances it appears desirable that an arrangement should be made between those countries, adapted by their position and other circumstances for international exhibitions, with regard to the time for the renewal of such exhibitions, and that this time should be announced at least two years previously to the opening of any such exhibition.

Rev. Montague Taylor, Juror, Class XXXIII.—1. Yes. 2. Because awards for merit are encouragements to persons to exhibit. 3. Certainly not. 4. No. 6. No appeal is desirable. The decision of the jurors ought to be final.

John Thompson, Exhibitor, Class IV.—1. No. 2. Awards give to successful exhibitors an unfair advantage over others, which in many instances is very unfairly earned. Some parties exhibit goods not of their own manufacture, and have obtained medals, their own goods being much inferior to those exhibited, and thereby the public are imposed upon. 3. Yes; for similar reasons. 4. If awards are given, jurors should be chosen by exhibitors of each class, either by ballot or open voting, or by ballot-papers sent in to the secretary. 5. Juries should not be composed of persons who are in the same business, and competing manufacturers and tradesmen, who are, according to all knowledge of mankind prejudiced persons. Jurors should be men well acquainted with the character of the goods exhibited and with an unblemished reputation. 6. Not if jurors were appointed by the exhibitors. As juries were appointed at the present exhibition there should be an appeal. 7. Exhibitors can always bring before the public in the fullest manner anything that merits special notice.

E. Tidemann, Commissioner for Norway.—1. Yes. 2. Because it is the only inducement for the industrial class to send their productions for exhibition. This is particularly the case in Norway, where it is very difficult to induce people to manufacture for exhibitions, and should this sort of encouragement be abolished, is afraid the difficulty would be still greater, and believes the same argument applies to other countries. 3. No, for the same reason. Artists is general are very little disposed to lend their pictures for a period of eight or nine months, and have also little chance of selling them in foreign countries, so, taking into consideration the many risks and dangers of damage that are incurred by transport, it is evident that to cease giving awards of merit would be greatly adding to the disinclination of artists to contribute to International Exhibitions. It is difficult to judge works of art, but the reasons given above must be taken into consideration. There was very little inclination at Düsseldorf to take part in this exhibition, and for this reason the school was not so well represented as it might have been There ought to be several degrees of awards for arts as well as for manufactures. The present system of having only two degrees of award (medal and honourable mention) has been the cause of a vast amount of inconsistency and dis-

satisfaction; the productions of very ordinary silversmiths received the same mark of merit as works of the highest art from such firms as Hunt, Elkington, Christofle, Vollgold, &c. The adopting an absolute standard as a general basis for decision has certainly its difficulties, more especially when small States are brought into competition, for the rigid adoption of this principle would tend to exclude them; notwithstanding this, an absolute standard in some cases can be the only just one. An intelligent jury should have the opportunity of acknowledging the endeavours of smaller States at exhibitions, even if they did not succeed in reaching the highest standard of merit. The absolute standard would be more practical with large and more cultivated States, which are nearly all upon the same level, but where States of less importance are brought into competition, the modified principle would be more advisable. As the writer has never been on a jury, he can hardly consider himself competent to offer an opinion upon these matters, so possibly his remarks may be incorrect. 4. If prizes are necessary, there must be some sort of organisation through which they should be adjudged and awarded. Juries are therefore necessary. 5. The jury should act in a different manner to that which has been done in the present instance, and they should not begin their labours too soon; this time they commenced long before the various classes were thoroughly complete; they ought also to seek the assistance of the Commissioners who have had all the arrangements. No visit ought to be undertaken by the jury until everything is in its proper place. The jury ought to give a day's notice before making their inspection, and to be punctual at their appointed meetings; this time it was frequently the case that juries who had signified their intention to come did not, and, *vice versa*, juries suddenly came without giving the slightest intimation; consequently, he was not prepared to receive them, and his exhibitors were placed at a disadvantage. There ought to be a longer period granted to the juries to make their visits; seven or eight weeks in an exhibition like the past one is not sufficient. In the Paris Exhibition of 1855, they required the whole period the Exhibition was open to bring their labours to a satisfactory end. 6. Yes, a higher authority to appeal from the decision of the jury is certainly necessary.

C. F. Waern, Commissioner for Sweden.—1. Yes. 2. The parties interested in the distribution of prizes are the promoters and commissioners of the International Exhibitions, the Governments or authorities appointing juries, the jurymen, the exhibitors, and the public. As the first two classes may be presumed to consider all public benefit gained by the distribution of prizes as remunerating the trouble and expense, the question of public benefits may be proper to be specially considered, as it affects each of the three last-mentioned classes. *a.* Jurymen.—Persons, from their scientific acquirements and positions, suited to become jurymen, may be in a position to visit an International Exhibition at their own expense, or to have claims on their respective Governments, or on scientific or industrial associations, to be sent over at the expense of such bodies; and juries, for the distribution of prizes, will practically tend to increase the number of persons visiting the Exhibitions, thereby deriving advantages to themselves, their countries, and the world in general, a result which must follow from a greater and a more general and more detailed knowledge by such persons of the state and progress of industry, &c. Such persons derive great advantages from the intercourse with other scientific and talented men, the communication of knowledge, and the exchange of ideas with them to which the common determination of awards will lead. They may certainly find and speak to each other at Exhibitions without being jurymen, but, practically, the advantages mentioned will, in that case, either not be gained at all or in an inferior degree, and at best at an enormous loss of time for introductions, exchange of civilities, appointments and agreements, to gain that which the institution of juries and determination of awards procures by itself, viz., united labour. Lastly, nothing can so sharpen the wits of such persons, increase their energy, and induce the labour required of them for the thorough examination of articles, as the feeling of responsibility of being jurymen, and the ambition of gaining the esteem and good-will of their peers, with whom they are engaged. Considers, therefore, as advantages of the distribution of prizes, and consequent institution of juries, any system which adds to the number of scientific and talented persons visiting and profiting by the Exhibitions; it increases their means of acquiring knowledge, and it obliges them to exertion. *b.* As regards exhibitors.—The exhibitors are benefited by the exertions to which the competition leads them, by the opportunities the visits of the juries afford them of displaying their articles before persons competent to judge of their quality, and hearing the opinions of such persons, and by the increased sales of articles for which prizes have been awarded. Of the benefits from competition in general, unnecessary to say anything. The advantages to exhibitors afforded by hearing the opinions of competent persons must not be overlooked. No doubt it is not the business of the juries directly to instruct exhibitors, nor will time permit its being done, but a remark or suggestion may sometimes prove most valuable; it may often be of the greatest importance to an exhibitor to know why his articles are not so highly valued as those of his competitors, and when it appears as if a little thing were wanting to bring an article to perfection, the interest created may lead to advice and assistance. Competent persons no doubt look at exhibited articles, and speak to exhibitors, without being jurymen, but the strict examination necessary for the distribution of prizes, and the opportunity of speaking to the jurymen, which that examination affords, must prove beneficial. Foremost among the advantages is, of course, the increase of sales of the articles. For some staple branches this has been denied, and even great harm done by the prejudice created through mistakes of the juries. Admitted that many industries are of such a nature that the quality of the articles produced by them must be tried by actual use, and cannot well be judged by samples. In such cases juries must either give no prizes at all (as was very properly resolved upon at the present exhibition, with regard to artificial manures), or they must found their awards on general knowledge, independent of the articles exhibited, in which case their awards only stating generally known facts, must be considered as of little value. It is also evident that as no human judgment is infallible, some amount of unjust prejudice will be created by the awards. But it appears that as regards the former objection it only applies to some few branches of industry, and does not affect the great majority of cases, and that as regards the latter objection, first of all the number of such cases must be very small in proportion to those where the awards are just and well merited; secondly, that number may be diminished by the exhibitors themselves not only making good articles, but also taking care to make the good qualities of their articles evident, by accompanying them with good descriptions; thirdly, the exhibitors are not altogether without a remedy, as they may appeal to public opinion through the public press; and, lastly, the harm done will be less, as the public will learn correctly to estimate the nature of the awards, which are not to be absolute proof of comparative excellence, but good indications thereof. *c.* As regards the public.—The advantage of obtaining good information as to the value of articles being mutual, or even greater to purchasers than to sellers, and, therefore, in stating the advantage to the exhibitors, has stated it as regards the public. The public does not consist of purchasers only, it also comprises statesmen, heads or members of associations for the promotion of knowledge or education, teachers of industrial schools, and other persons, who may have it more or less in their power to influence the march of industry in their respective countries. To these men the awards of the juries and their reports greatly facilitate an

insight into the comparative development of trade and industry in different countries. None or few prizes to exhibitors of some class from a country, clearly show a deficiency in the manufacturers of the country, and a great number of medals to exhibitors in the same class from another country, shows where the knowledge or talent wanted may be obtained. Without distribution of prizes there can be no jury, and without juries no juries' report, and that document forms a most valuable addition to the public knowledge of an exhibition, and remains when the exhibition is past as the most reliable information of the state of industry at the period when it was held. Many books will be written of every description, from which books many things may be learnt, but none can be so valuable, nor so reliable for comprehensiveness, exactness, and impartiality, as the work that forms the joint results of the full and patient investigations of so many and so talented visitors as the jurymen acting under so great a sense of moral responsibility. 4. No. 5. As regards the organisation of the juries has nothing to suggest, but as regards their manner of proceeding makes the following remarks:—The beginning or even the middle of June is decidedly too early for the commencement of the inspections of the juries at an Exhibition opening the 1st of May. From the northern countries the articles cannot arrive before June, and have then to be unpacked and arranged, catalogues to be altered and completed, memorandums to be translated, &c., before they are ready to be inspected. Nor is this only the case with northern countries. When, at the recent visits of juries, the writer was under the necessity of asking them to defer their inspection of his department, heard constantly the presidents or chairmen of the juries proposing a visit to some other more southern country (sometimes one, sometimes another), with the remark, "They are just as bad as you are—not ready yet." Believes it would be well if the juries did not meet for the inspection till at least two months after the opening of an Exhibition, but their time ought by no means to pass unprofitably for their work. The jurymen of the country in which the Exhibition is held should have meetings very soon after the opening, and elect secretaries, who, under the guidance of the Special Commissioner for the jury department, should form catalogues, and collect all memorandums from commissioners and other information, which past experience shows that juries will want. Catalogues cannot be got ready till the opening of an Exhibition, except they are prepared months beforehand, but many exhibitors will then advise articles that they do not afterwards send, and others will send articles not beforehand advised, of such excellence that permission for their being exhibited will not be refused. Catalogues published for the opening will, therefore, always be incorrect; but it is necessary that the juries have correct lists of what they are to inspect, and the preparation of such lists beforehand will greatly facilitate the work of the juries and prevent mistakes, otherwise unavoidable. Further, the writer received, during the time of the visits of the juries, numerous printed circulars, with questions to be answered by him, or by exhibitors in his department. To all those questions he should have been glad to give or procure replies containing full information, but in many instances it was altogether impossible from the shortness of the time within which those replies were necessarily expected. These questions were not founded on any previous inspection of the articles by the juries. They were general, and could as well have been issued weeks beforehand, if the juries had had some preliminary meeting then for the purpose, or secretaries had been elected for each Class, with orders to procure the information wanted. Even if such an arrangement should be impracticable, still a later inspection of the juries would prove beneficial, in enabling the foreign commissioners to complete their catalogues, and provide all the information they are able to judge may be wanted. True, that such information may be collected even before the opening of the Exhibition, but for reasons already mentioned, it cannot then be fully adequate to the purpose, or comprise all the articles sent as it ought to do. Besides, the advantages of fuller knowledge being gained, and many mistakes prevented, the inspections of the juries may, when once they begin, through this arrangement, go quicker, and the jurymen will be able to attend them better, and at less inconvenience or expense. It is my conviction that the final awards may then be made at a very little later time than was the case this year. Full time ought, however, to be given for the correction of the awards of the juries before they are published. The secretaries of the juries ought for this purpose to communicate with the Commissioners for the different classes, countries, and colonies. It will certainly be both better, more agreeable, and really a gain of time, if the lists of awards are first corrected and then published, instead of, as now was the case, first published and then immediately afterwards corrected. 6. No. The whole work of the juries, and the awards themselves, would be a mockery if they were not final, and the moral sense of responsibility of jurymen would be lessened if they knew that appeals might be made, and would be judged by other persons. Has thought of the possibility of allowing dissatisfied exhibitors to remonstrate to the Council of Chairmen, and of that Council having the power to order that such remonstrances, as they consider deserving thereof, to be printed with the reports of the juries, together with such explanations as the secretaries of the juries might be desirous of giving. But considering how odious this arrangement might prove to the juries and their secretaries, what a mass of remonstrances would thereby be invited, and what amount of trouble and work it would cause the Council of Chairmen, is inclined to think such an arrangement impracticable, and the benefits to be gained thereby not worth the inconveniences. 7. Approves of the present system. 8. Considers the time for the meetings of the juries to inspect articles should be taken later after the opening than was the case this year. See reply to question 5.

(*To be continued*).

OBITUARY NOTICE OF JOSEPH GLYNN, F.R.S.

The subject of this memoir was a native of the North of England, which has produced so many men eminent in mechanical and engineering pursuits. He was the son of Mr. James Glynn, of the Ouseburn Iron Foundry, Newcastle-upon-Tyne, and was born in Hanover-square, in that town, on the 6th of February, 1799. The same master who taught the rudiments of mathematics to Robert Stephenson, Mr. John Brace, of the Percy-street Academy (himself a mathematician of considerable attainments), who turned out many pupils attaining eminence in various walks of life, assisted in the intellectual training which enabled Mr. Glynn to apply to useful purposes the mechanical endowments with which he had been gifted, and which seem to be born with their possessor rather than acquired by after education. He continued at the Ouseburn Iron Foundry as his father's assistant till the year 1820, when he executed his first engineering work, which was the erecting of a steam-engine for the Earl of Carlisle, to drain the Talkin Colliery, near Brampton, Cumberland. He was assisted in the execution of the work by two young mechanics, then workmen, who have both attained great eminence in their several walks, Sir Peter Fairbairn and Mr. Robert Hawthorn. In the following year, 1821, the introduction of coal gas having rendered the inhabitants of Berwick-upon-Tweed discontented with the old lights, he was called in to design and execute the gas works of that place. The success of these gas-works was so complete, that he was applied to by the inhabitants of Aberdeen to design gas-works for that city, and he furnished reports and plans, though his other engagements prevented him from superintending their execution, being engaged by the Butterley Iron Company, in the county of Derby, as their engineer.

From this time Mr. Glynn's individual reputation became almost merged in that of this Company, with which for more than a quarter of a century his name was associated. Stationary engines of small power were employed in those days in drawing to the surface of the earth its buried treasures; but he gradually increased their power until it reached two hundred horses. The locomotive was struggling into being through the efforts of Trevithick and Brunton, and in the brain of George Stephenson. In his visits to Killingworth with his schoolfellow, Robert Stephenson, young Glynn "sat at the feet of Gamaliel," and the seed sown in these interviews afterwards ripened into works of solid practical utility. The Butterley Company undertook and executed works of whose merit it will never be known how much was due to their engineer, and how much to them as contractors. The great engineers of that day found useful auxiliaries, and a formidable arsenal, in the extensive resources of the Butterley Iron Works. Sir John Rennie was at that time employed by the Government to complete the Royal Naval establishment at Sheerness, and Sir Edward Banks undertook the works as contractor for a sum of nearly one million sterling. A great part of the iron work for this extensive contract was executed at Butterley. The same engineer and contractor undertook the building of the new London Bridge, probably the most beautiful work of the kind ever executed in any age or country, and the steam machinery for keeping out the water while the works proceeded was supplied from the same source which had already furnished the ironwork of Vauxhall-bridge, erected from the designs of Mr. James Walker. Mr. Miller, afterwards senior of the well-known firm of Miller, Ravenhill, and Salkeld, who was Mr. Glynn's predecessor at Butterley, had previously begun the engines of the *Lord Melville* for the General Steam Navigation Company; these were completed by Mr. Glynn, and were followed by the *Earl of Liverpool*, the *Attwood*, the *Sir Edward Banks*, the *City of London*, *Royal Sovereign*, *Brocklebank*, and *Ramona*, for all of which the engines were designed by Mr. Glynn. The Gainsborough and Hull packet, and the *Trent*, plying on the Humber, were also the precursors of a system of river navigation by steam for the conveyance of merchandise, which the *Rob Roy*, with engines designed by him, carried to Hamburg.

The engineering skill of Mr. Glynn was also called in from time to time to repair and reconstruct several steam vessels built elsewhere. The *Victoria*, of which the boilers twice exploded, was made a trustworthy and seaworthy vessel by his alterations. The *Harlequin*, *Columbine*, *Superb*, *Hylton Jolliffe*, *Rapid*, *Talbot*, *Belfast*, *William Jolliffe*, and *Mountaineer*, all passed under his hands, and were altered and made effective by the Butterley Company. The *Firefly* and *Firebrand* for the English navy, and the *Jason* and the *Colchis* for the Russian government, were fitted with engines from his designs, as were the *Nicholas I.* and the *Alexandra*, the first steamers from Lubeck to St. Petersburg under the Russian flag. The Butterley Company also fitted out steam dredging vessels for the state of Lubeck, for the Hanoverian government, and others. The iron roofs, mills, and heavy machinery which were executed from Mr. Glynn's designs, and which were despatched from Butterley to all parts of Europe, to the Colonies, the East and West Indies, and the continent of America, bore testimony to his industry as well as to the fertility of his invention, though these modest labours seldom came before the world. The number of powerful steam engines executed at Butterley for mining purposes was very considerable, both in pumping and winding engines, one of which was erected at Leasingthorne Colliery, near Ferry-hill, for the Durham County Coal Company. Mr. Glynn had a high opinion of water as a motive power, and executed some water wheels of large dimensions. His name, however, will be chiefly associated with the employment of the water wheel, or scoop-wheel as it is called, in draining marshes and fens by steam power. A water wheel driven the reverse way by a steam engine where the object is to lift a large quantity a short distance, has been found greatly superior to any system of pumps, and this plan was used by Mr. Glynn with great success in the fen country in England, and also in Hanover, and Holland, a "polder," near Rotterdam, having been thus drained. He was in correspondence with his late Majesty the King of the Netherlands concerning the application of this system to the Lake of Haarlem, when the abdication of his Majesty transferred the execution of the project to other hands, and it has since been successfully carried into effect by pumping engines. He also drained by steam power the following districts, amounting to many thousand acres:—Deeping fen, near Spalding, Lincolnshire; Misterton Soss, with Everton and Grindley Carrs; Littleport fen, near Ely, Cambridgeshire; Magdalen fen, near Lynn, Norfolk; Middle Soham fen, Cambridgeshire; Soham Mere, Cambridgeshire; Sutton and Mepal, near Lynn, Norfolk, altered by him in 1861; Waterbeach level, Cambridgeshire; March district, March West fen, Cambridgeshire; the Binnimoor district, Mildenhall, Suffolk; and Lakenheath, Suffolk, for which the Butterley Company manufactured the engines from his drawings; also for the Hammer-brook drainage, near Hamburgh, of which Mr. Lindley was the engineer under the Hamburgh government. He also executed some drainage works by steam power in the Colonies, one of which, fulfilling a double purpose, was erected in British Guiana, drainage in the wet season being combined with irrigation in the dry season. His drainage works in the counties of Cambridge, Norfolk, Suffolk, Lincoln, and York, were extensive and successful. Mr. Glynn also designed and constructed, from his own designs and those of other engineers, many iron bridges, among which may be mentioned the bridge between Doncaster and Selby, a complete and elegant structure, known as Haddlesey bridge. He also constructed, for the Dean and Chapter of Ely Cathedral, an iron bridge at Ely, which, though now eclipsed by the Railway works near it, was at the time much admired. He also built, from designs taken by Mr. Milne from the celebrated bridge at Florence, a bridge across the Cam at Gerard's Hostel, Cambridge; also from Mr. Walker's plans the lifting bridge at Selby, on the line of the Hull and Selby railway.

Mr. Glynn was concerned with Mr. Jessop in setting out the Midland Counties Railway. He was one of the Committee by whom the purchase of the Great North of England Railway was negociated for the Company now called the North Eastern He also took an active interest in the affairs of the Midland Railway before mentioned, with the working of which, in the neighbourhood of Derby, he was well acquainted. He was the Secretary of the Committee of Investigation into the affairs of the Eastern Counties Railway; and when, in consequence of their report, Mr. Hudson and Mr. Waddington resigned, Mr. Betts was appointed Chairman, and Mr. Glynn Deputy-Chairman, of that Company. On the retirement of Mr. Betts shortly after from the active duties of the Board, Mr. Glynn filled the office of Chairman for two years.

The Gold Isis Medal of the Society of Arts was voted to Mr. Glynn for a communication dated 8th of February, 1836, on his application of steam power to draining fens. This paper was republished in French, and also was translated into German, and published in Hanover. It was published in Mecklenburg, and was also translated into Dutch, and published in Holland. Descriptions of cranes for the Royal Dockyard at Woolwich were contributed by Mr. Glynn to the professional papers of the corps of Royal Engineers, as well as other useful and valuable writings. The want of similar publications in his youth had made him feel the shortcomings of many scientific works, and his object in writing was rather to produce a hand-book for the use of the mechanic and the artizan than an elaborate treatise of little practical use. Mr. Glynn contributed several papers to the Transactions of the Institu

tion of Civil Engineers, of which the following excited much public interest. On the 22nd June, 1847, he read before the Institution, and in the presence of the present Emperor of the French, "A Review of the Plans which have been Prepared for Connecting the Atlantic and Pacific Oceans by a Navigable Canal." The Emperor of the French, then Prince Louis Napoleon, having written on the subject, was invited by Sir John Rennie, then President, to take part in the discussion, and spoke at some length. On the 20th of May, 1851, Mr. Glynn read a paper, "On the Isthmus of Suez, and the Canals of Egypt," which drew forth a most interesting disquisition from Mr. Robert Stephenson. Mr. Glynn contributed to Mr. Weale's rudimentary series one of the most popular, "A Treatise on Cranes," of which work 30,000 copies were sold, and which has been translated into nearly every European language. The "Treatise on the Power of Water" has met with nearly equal success, and has put within the reach of the millwright and the mechanical engineer the information which a few years since was confined to the mathematician.

On the 16th November, 1836, he was elected a member of the Society of Arts, and subsequently a Member of the Council and a Vice-President.

On the 8th February, 1838, he was elected a Fellow of the Royal Society. He had been for several years previously a Member of the Institution of Civil Engineers. His first contribution to their archives was a translation of "Perdonnet's Account of the Iron Works of France," which had been previously but little known to Englishmen interested in the trade.

The opinion of Mr. Glynn, as a sound practical man, was much valued by the profession, and his evidence was sought in many cases of disputed patents; his judgment in the arbitration and settlement of disputes where mechanical matters were concerned was highly esteemed. He was examined before the Royal Commissioners on the use of iron in railway structures, and reported on the Overland Route to India, and the competing scheme of the Euphrates Valley, and gave evidence before Committees of the Lords and Commons on various railway and other projects.

He died in London, on the 6th inst., aged 64.

Home Correspondence.

THE SUBMARINE CABLE.

Sir,—I have read, with considerable interest, a paper, by T. A Masey, upon "The Submarine Telegraph," as published in the *Journal of the Society of Arts*, January 30th.

Although it may appear invidious for a man to speak of his own works, useful and scientific, I feel assured that, as an Englishman, my fellow-countrymen will feel pleased to accord to me, in the national spirit of fair play, the merit which is simply due to my exertions.

Were it not that I have documentary evidence in proof of my assertions, I should feel greater diffidence in making the following remarks:—Should a man succeed in flying through the air from the Crystal Palace to St. Paul's, we should have hosts of parties claiming priority of the idea, despite the numberless records in proof that even the ancients possessed similar aspirations. The merit, nevertheless, of rendering the flight practicable and of interest to the outer world, would rest with the man who first proved, by a shorter flight, that the whole distance could be accomplished.

I claim to have taken the first practical steps towards the accomplishment of the Atlantic telegraph line, by connecting the easternmost point of Newfoundland with the continent of North America, it being self evident that an Atlantic cable could alone render the necessary investment of capital productive, and that only by a clear demonstration as to its feasibility could such capital have been procured.

Step by step I worked the problem out, making the first survey across Newfoundland in anticipation of the undertaking, and laying the first submarine cable submerged in American waters. To myself, personally, was granted the first exclusive charter for constructing lines across Newfoundland, and I was associated in the second charter, conveying more extended privileges. I then constructed the line, resigning my duties only when the whole route between New York, Canada, and Cape Race was in perfect working order.

It is a matter of history in British America how Mr. Cyrus Field and his friends (who wished to appear before the world as the originators of so great an enterprise) interfered with my rights in connexion with the Atlantic line; and I shall be pleased to show the public documents and extracts from the British and American press, in substantiation of such history.

At present, I confine myself to the following remarks:—That second upon the list of submarine cables, the following entry should, by right, appear:—

"1852. From Prince Edward's Island to New Brunswick, one conductor, No. 16, copper wire guage. Ten No. 8 galvanized outside wires. Distance, 12 miles. Depth of water, 14 fathoms. Manufactured by R. S. Newall & Co. Imported and laid by F. N. Gisborne. Working 3 years."

The shore end of this cable was injured by ice during the third winter, and was so damaged afterwards by an ignorant repairer (who actually raised the whole of the cable, in lieu of underrunning it), that it was found expedient to replace it by a new cable during 1856.

In conclusion, I would remark that I have seen the gutta percha covering of wire eaten through and through by marine animalculæ, and secondly, from experience, I know that it is a matter of extreme difficulty to manufacture a cable with hemp or any other partially elastic outer covering. Mere specimens of cables are eminently deceptive as to the possibility of producing a similar article in greater lengths.

You are quite at liberty to make such use of this letter as you deem proper, and

I am, &c.,
F. N. GISBORNE.

Proceedings of Institutions.

Droitwich Literary and Mechanics' Institute.—The members of this Institution held their annual *soirée* in the assembly-room at the George Hotel, on Monday evening, 5th January. The room was very handsomely decorated. Over one of the chimney pieces were the initials of Mr. and Lady Georgina Vernon, formed of crystallised salt, which glittered brightly in the light and had a very pretty effect. Mr. H. F. Vernon, M.P., presided, and was supported by Sir J. S. Pakington, Bart., M.P., Mr. P. Amphlett, Rev. W. W. Douglas, Mr. J. S. Pakington, Mr. R A. D. Gresley, &c. The Institute brass band, led by Mr. Holyoake, performed during the evening, and the vocal arrangements were under the superintendence of Mr. Hunt.—The Chairman announced the reception of letters from Sir Charles Hastings and Sir E. A. H. Lechmere, Bart., the High Sheriff of the county, regretting their inability to attend the *soirée*. He then proceeded to say, that, seeing the varied and interesting nature of the programme, he should not address the company at any great length, and he was afraid that the few remarks he might make would hardly be considered worthy of the name of an opening address. However, he was sure they would be convinced that the interest he took in the welfare of the Institution was of no superficial kind, and that it was with extreme pleasure he viewed

the praiseworthy exertions made from time to time by their committee.—Sir J. S. PAKINGTON rose to move the first resolution. The Right Hon. Baronet said he obeyed the call of their Chairman with the greatest possible pleasure, and he might add that he always rose with the same feelings to address the annual meetings of the friends of the Mechanics' Institution of Droitwich. The resolution which had been placed in his hands was one which he entirely approved. It was—"That Mechanics' Institutes present to philanthropists many attractive objects: they bring into intimate association the high and the low; and theoretically and practically, and by force of example and judicious foresight, point the way to attaining health of body and vigour of mind." He entirely concurred in the wording of that resolution, and in no part of it did he more agree than in that which stated that institutions of that character brought together the high and the low, and he thought they had a very happy illustration of it in the company which attended their annual meeting that evening, as it showed the beneficial manner in which some sought for recreation and others for instruction. Taking the practical principle, he might say that the trading, the working, and the higher classes, were happily brought together wherever those institutions existed, and in an harmonious manner which was beneficial to all of them. So it was with the theoretical. Institutions of that kind afforded innocent and useful recreation and the means of instruction to those who sought it after that period of life when they ceased to attend school. He was sure he need not dwell upon the latter part of the resolution, wherein it stated that the members of such Institutions attained health of body and vigour of mind. If the advantages of those Institutions were properly recognised and properly used by those who resided within the circle of their influence, then the great object of them was certainly to increase the health of the body and invigorate the mind, and so improve the intellectual by an attainment of that amount of stock knowledge without which we, as a nation, should have been unable to effect that progress which we now saw being made around us. With regard to their particular institution at Droitwich, he trusted that it would increase, and that progressive prosperity would attend it. He was happy to hear that, in a financial point of view, the institution was prosperous, and he trusted it would long continue so.—The resolution was seconded by Mr. P. AMPHLETT.—Mr. J. S. PAKINGTON moved the second resolution, as follows:—"The prosperous financial condition of the Institute is a subject of congratulation, and proves that the resolution passed at the last meeting, showing that the Institute was entitled to the support of all classes, has met with a liberal response."—Mr. J. BLICK, the Mayor of Droitwich, seconded the resolution.—Sir JOHN PAKINGTON bore testimony to the beauty of the decorations, and proposed a vote of thanks to the ladies, which was seconded by Mr. AMPHLETT, and carried with acclamation. Mr. BRADLEY replied on behalf of the ladies, after which a vote to Mr. Vernon, on the motion of Dr. RODEN, seconded by Mr. J. CURTLER, surgeon, was proposed, and to which the CHAIRMAN appropriately replied, proposing in conclusion the thanks of the meeting to the Institute band for their services, which was suitably acknowledged by Mr. HOLYOAKE. After a little more music, the company betook themselves to dancing.

METROPOLITAN ASSOCIATION FOR PROMOTING THE EDUCATION OF ADULTS.—A public meeting was held on Friday, January 30th, at St. Paul's School-room, Southwark, for the purpose of bringing under the notice of the working men in that neighbourhood the plans of the Association. The chair was taken by J. Locke, Esq., M.P. Addresses were given by the Rev. J. Wallis, Hon. Sec., and Mr. H. H. Sales, Secretary, explanatory of the scheme of Examinations conducted by the Society of Arts and the Metropolitan Association. On the motion of Mr. Churchwarden Myers, seconded by Rev. J. Rylance, it was resolved to establish a Local Board for the district. The Chairman addressed the meeting at some length on the advantages of education, and expressed his approval of the various operations of the Association.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Medical, 8½. Mr. Thomas Bryant, "On the Differences between the Diseases of the Nervous, Respiratory, Circulatory, Digestive, and Urinogenital Systems of the Child and Adult."
Asiatic, 3.
Royal United Service Inst., 8½. Capt. G. B. V. Arbuckle, "A New System of the Application of Iron to Forts and Ships."

TUES. ...Civil Engineers, 8. Discussion, "Drainage of Dundee," and "Sewerage of Newport (Mon)."
Statistical, 8. Rev. J. E. T. Rogers, "On the Rationale and Working of the Patent Laws."
Pathological, 8.
Ethnological, 8.
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."
R. Horticultural, 2. Ballot for Seeds.

WED. ...Society of Arts, 8. Mr. A. Nesbitt Shaw, "On the Best Means of Promoting the Growth and Improving the Quality of Cotton in India."
Geological, 8.

THURS...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. 1. Mr. F. Smith, "On the Geographical Distribution of the Aculeate Hymenoptera of the Eastern Archipelago." 2. On the Anatomy of the Guinea Worm (*Filaria medinensis*)."
Chemical, 8.
Numismatic, 7.
R. Society Club, 6.
Royal Inst., 3. Dr. E. Frankland, "On Chemical Affinity."

FRI.......Geological, 1. Annual Meeting.
Philological, 8.
Royal Inst., 8. Mr. G. Williams, "On Jerusalem."
Royal Horticultural, 2. Election of Fellows.

SAT.......Royal Inst., 3. Prof. Max Muller, "On the Science of Languages.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, January 30th*, 1863.]

161. H. Rushton, Northampton-road, Clerkenwell—Imp. in machinery for plaiting cotton, thread, or other fibrous material over steels for crinolines, and in the mode of securing the plaiting to prevent it slipping thereon.
162. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of sulphate of soda for conversion into soda and other uses. (A com.)
163. W. H. Harrison, Haverfordwest—Imp. in covering wire and other iron articles for the purpose of protecting them from oxidation, and in the mode or method employed therein.

Dated 20th January, 1863.

167. J. Mosheimer, Dolgelly, Merioneth, Wales—Imp. in machinery for crushing and grinding quartz and other substances.
168. J. Bell and J. Speight, Phœnix Iron Works, Jersey-street, Manchester—Certain imp. in the construction of carding engines.
169. W. Mawson and J. Whitehead, Calverley, near Leeds—Improved hydraulic machinery for raising water in mines, wells, and other places.
170. H. A. Bonneville, 24, Rue de Mont Thabor, Paris—Imp. in the manufacture of clocks. (A com.)
172. M. Henry, 84, Fleet-street—Imp. in apparatus for retarding and stopping railway carriages. (A com.)
175. H. Hughes, Homerton, and J. Sanders, Nottingham—Imp. in machinery and apparatus for the manufacture of trimmings and cap fronts.
176. S. Blackwell, 259, Oxford-street—Imp. in apparatus for applying water or other fluid to the legs and other parts of horses and other animals.

Dated 21st January, 1863.

178. A. Phillips, Glasgow—Imp. in looms for weaving figured fabrics.
180. F. A. Busch, Briton Ferry, South Wales—Imp. in the manufacture of metallic vessels or receptacles for containing liquids or substances.
182. H. B. Barlow, Manchester—Certain imp. in jacquard machines. (A com.)
184. A. Boubee, Paris—Imp. in apparatus for casting or moulding articles in glass, and in imitation of precious stones or marbles.
186. W. Clark, 35, Chancery-lane—Imp. in desiccating and in preserving matters from decay (A com.)
190. A. Pennington, 1, Rectory-villas, West Hackney—Imp. in apparatus for beating mats, rugs, and other such like articles.

Dated 22nd January, 1863.

194. W. Harrison, Blackburn, and B. Croasdale, Witton, near Blackburn—Certain imp. in looms for weaving.

196. J. Grant, Albion-place, Maidstone, Kent—Imp. in the construction of sidings and loop lines for railways or tramways, whether portable or otherwise.
200. W. Blackwood and J. Blackwood, Dumbarton, N.B.—Imp. in machinery for drying yarns or threads.
202. N. Wood, Hetton-hall, Durham, and J. Stockley, Newcastle-on-Tyne—Imp. in apparatus for grinding, smoothing, and polishing plate glass.
204. C. Lungley, Deptford, Kent—Imp. in means for facilitating the repairs of ships and other structures.

[*From Gazette, February 6th*, 1863.]

Dated 18th October, 1862.
2816. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus for extracting condensed steam. (A com.)

Dated 27th November, 1862.
3182. J. L. Linton, Buckingham Palace Hotel, Buckingham-gate—Imp. in the means of generating steam, and in the apparatus to be employed therein. (A com.)

Dated 9th January, 1863.
76. E. A. Goupil, 10, Rue d'Hauteville, Paris—An improved locomotive apparatus.

Dated 13th January, 1863.
102. T. Boyle, Gray's inn-terrace, Gray's inn-lane—A new apparatus for multiplying indefinitely the reflections of all objects that are capable of being viewed in it.

Dated 15th January, 1863.
131. T. C. Barraclough, Manchester—An improved alarum apparatus, which may be employed in connection with locks or other fastenings. (A com.)
132. J. Harrop, Manchester—Imp. in the treatment of organic, fecal, and urinous matters for the purpose of deodorising the same, and in the preparation of a portable manure therefrom, and in the treatment of ashes or other refuse of combustion to be combined therewith, also for imp. in machinery to be employed in the manufacture of the said manure.
134. R. Ferrier, Edinburgh—Imp. in wet gas meters.

Dated 16th January, 1863.
144. J. Kerr, Manchester—Certain imp. in the means of retarding or stopping railway and other carriages.

Dated 17th January, 1863.
150. J. Edwards, 29, Basinghall-street—Imp. in the manufacture of buttons.
156. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of buttons. (A com.)

Dated 19th January, 1863.
158. C. Norton, 47, Hawley-road—A new or improved method of roughing horses.
164. J. J. Lundy, Leith—Imp. in the manufacture of metallic casks and vessels.

Dated 22nd January, 1863.
198. J. M. Binger, Brussels—An improved paste or composition to cover the rollers used by letter-press printers.

Dated 23rd January, 1863.
206. J. Milner, 7, Bridge-street, Westminster—Imp. in steam-engines.
208. E. Strangman, Waterford, Ireland—Imp. in pipes for smoking.
212. P. A. Cole, Croydon-street—Imp. in articles of dress known as collars, cuffs, wristbands, shirt fronts, habit shirts, and petticoats.
214. E. T. Hughes, 123, Chancery-lane—Imp. in breech-loading fire arms. (A com.)

Dated 24th January, 1863.
216. W. Mellor, Ardwick, Manchester, and W. Whaley, Rainow, Cheshire—Imp. in steam hammers and other engines driven by steam.
220. M. A. F. Mennons, 24, Rue de Dunkerque, Paris—Imp. in machinery for punching and cutting metals. (A com.)
222. A. J. Sax, Paris—Imp. in rendering drum skins and gut strings less liable to hygrometric influences.
224. F. Tolhausen, 17, Rue du Faubourg Montmartre, Paris—Imp. in looms for weaving ribbons. (A com.)

Dated 27th January, 1863.
236. C. Askew, Charles street, Hampstead-road—An improved railway chair and joint for rails on railways.
238. R. A. W. Green, Putney, Surrey—Imp. in light rowing boats, usually termed wager boats.
242. W. C. Wilkins, Long-acre—Imp in lamps.

Dated 28th January, 1863.
244. H. Watson, Renton, Dumbarton, N.B—Imp. in the heating arrangements of stoves for drying woven fabrics.
246. W. E. Gedge, 11, Wellington-street, Strand—Improved machinery or apparatus for fastening by screws boots, shoes, and other articles composed of leather. (A com.)
248. J. Oglesby, J. Dickinson, W. M. Dickinson, and J. Dickinson, junr., York—Imp. in apparatus for steaming, cooking, and generating gas.
250. C. Mace, Sunderland—Imp. in steam engines for propelling vessels and for other purposes.
252. F. W. Wymer, 7, St. Ann's-row, Newcastle-on-Tyne—Imp. in steam engines.
252. W. Conisbee, 39 and 40, Herbert's-buildings, Waterloo-road—Imp. in cylindrical chromo-lithographic printing machines.
256. W. Clark, 53, Chancery-lane—Imp. in means and apparatus for copying and reproducing sculpture and other objects of art. (A com.)
258. C. P. Stewart and J. Robinson, Manchester—Imp. in and applicable to that apparatus known as "Giffard's injector," and in the adaptation of it to locomotive and other boilers.
260. H. Crichley, Birmingham—Imp. in reaping and mowing machines. (A com.)

Dated 29th January, 1863.
266. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of candles. (A com.)
268. W. Ball and J. Wilkins, Nottingham—Imp. in machinery employed in the manufacture of looped fabrics.
270. N. Clayton and J. Shuttleworth, Stamp End Works, Lincoln—Imp in thrashing machines.
272. A. Pritchard, Derby—An improved method of preserving the contents of packages from air, water, or damp.
274. W. Clark, 53, Chancery-lane—Imp. in the condensation of steam, and in apparatus for the same. (A com.)

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

262. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in the construction of granaries. (A com.)—29th January, 1863.
265. J. Mackenzie, Arundel-square, Islington—Imp. in shaping machines for curvilinear sufaces.—29th January, 1863.

PATENTS SEALED.

[*From Gazette, February 6th*, 1863.]

February 6th.
2231. Sir J. S. Lillie.
2233. A. J. Moreau and A. E. Ragon.
2334. A. J. Moreau and A. E. Ragon.
2235. T. De la Rue.
2244. J. Lancelott.
2246. W. E. Gedge.
2249. A. J. Martin, J. Goss, and J. Bush.
2257. A. Delrue.
2258. C. M. Westmacott.
2261. A. B. Childs.
2269. J. R. Tussaud and F. C. Tussaud.
2292. J. Hearn.
2313. F. Barnett.
2375. W. H. Turner.
2531. J. Pender.
2957. G. Haseltine.

[*From Gazette, February 10th*, 1863.]

February 10th.
2262. C. Sengry.
2263. G. Sanders.
2271. W. L. Boyle.
2273. H. Twelvetrees.
2280. A. Walker.
2281. J. Irvine.
2285. W. Beatson.
2287. D. P. Marques.
2290. W. J. Curtis.
2296. W. B. Herapath.
2297. C. E. Spagnoletti.
2301. T. Cawin.
2302. T. F. Kirby.
2305. J. H. Johnson.
2307. H. Garside.
2314. J. Cimeg.
2405. E. A. Pontifex.
2410. J. H. Johnson.
2423. J. H. Johnson.
2365. J. H. Johnson.
3115. J. Jewsbury.
3311. M. Osborne.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, February 10th*, 1863.]

February 2nd.
276. A. Denny and E. M. Denny.
279. L. P. Barre.
286. R. Fielden, jun. and T. Fielden.
288. R. Bodmer.

February 4th.
324. A. L. E. Breittmayer.
333. G. F. Wilson.

February 6th.
377. A. V. Newton.

February 7th.
335. J. H. Johnson.
345. J. Langford and C. Chester

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4536	Jan. 27.	Portable Clothes Drier or Bar	Carroll Eugene Gray	73, Great Suffolk-street, Borough.
4537	Feb. 4.	Improved form of Pistol	Thomas Woodward	23, Edward-street, Birmingham.
4538	,, 10.	Metallic Mounts for Gas or Lamp Reflectors	Herbert William Hart	125, Fleet street, E.C.
4539	,, ,,	Improved Ventilator for Dwelling Houses and other buildings	Jas. A. Forrest and Co.	Lime-street, Liverpool.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 20, 1863.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th inst., is now being issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary*.

The subscription of each member is limited to one guinea.

WOOD CARVING.

EXHIBITION AND OFFER OF PREMIUMS.

The Council have had under consideration a communication from the Society of Wood Carvers, asking the aid of the Society of Arts in promoting the art of wood carving in this country, and they have agreed to allow the use of the Society's rooms for the purpose of holding an exhibition of wood carving, both modern and ancient, in the month of June next. The Council have further agreed to offer the Society's Silver Medal and to make a grant of £30, the Society of Wood Carvers giving £15, as a fund for prizes to be awarded to the most meritorious exhibitors on that occasion, in the following divisions, thus:—

First Division.

Human figure in alto or bas relief. Animals or natural foliage may be used as accessories.

1st Prize of £8 and the Society's Silver Medal.
2nd Prize of £4.
3rd Prize of £3.

Second Division.

Animal or still life. Fruit, flowers, or natural foliage may be used as accessories.

1st Prize of £8.
2nd Prize of £4.
3rd Prize of £3.

Third Division.

Natural foliage, fruit, or flowers, or conventional ornament in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.

1st Prize of £8.
2nd Prize of £4.
3rd Prize of £3.

Employers or private owners may be Exhibitors, but *bonâ fide* workmen only can receive Prizes.

The Judges will be selected as follows:—Four by the Council of the Society of Arts, and three by the Society of Wood Carvers.

ELEVENTH ORDINARY MEETING.

Wednesday, February 18, 1863.

The Eleventh Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 18th inst., J. B. Smith, Esq., M.P., in the chair.

The following candidates were proposed for election as members of the Society:—

Caddick, Edward	West Bromwich.
Eastham, Silas	7, Market-street, Manchester.
Hartley, John Galley	22, Craven-st., Strand, W.C.
March, Richard Alfred	7, John-street, Adelphi, W.C.

The following Candidates were balloted for and duly elected members of the Society:—

Castriota Skanderbeg, H.R.H. Prince Georges, des Rois d'Epire et d'Albanie	3a, King-street, St. James's, S.W.
Chatfield, Charles	Broad Green House, Croydon, S.
Ferguson, James	Bridge-street, Inverness, N.B.
Machaffie, David	(Messrs. John Pender and Co.), Manchester.
McKay, Dr., M.D.	Castle-street, Inverness, N.B.
Piggott, Wm. Peter	16, Argyll-st., Regent-st., W.
Pouncy, John	Dorchester.
Rae, John, M.D.	21, Brompton-square, S.W., & 4, Fenchurch-street, E.C.
Rowland, John A.	Belmont, Upper Norwood, S.
White, William	2, Waterloo-place, S.W., and Forest-hill, Sydenham, S.E.

The following Institution has been received into Union since the last announcement:—

Ely Mechanics' Institute.

The Paper read was—

ON THE BEST MEANS FOR PROMOTING THE GROWTH AND IMPROVING THE QUALITY OF COTTON IN INDIA.

By A. Nesbitt Shaw.

At a season when thousands of our countrymen are famishing for the want of a medium of exchanging their honest labour for their daily bread, no man, however incapable he may be of doing justice to a great national question, need fear standing before a British audience to advocate the cause of our distressed population, by inviting a discussion on the best means of promoting the growth, and improving the quality, of cotton in India, with a view of alleviating the pressure of a calamity such as that now casting a gloom of despondency over the country, and averting the recurrence of a crisis which the course of events had long shadowed forth before it suddenly exploded, scattering misery and ruin throughout our manufacturing districts.

The first consignment of cotton to this country from the United States occurred in 1784, on which occasion eight bags were introduced into Liverpool, and these were seized by the custom-house officers, under the impression that cotton was not produced in America; and as late as the year 1791, when cotton was extensively cultivated in India, the exports from America amounted to only 189,316 lbs. In India, at that time, the East India Company enjoyed a monopoly of the trade, but it would be fruitless to speculate on what might have been the effect had that Company, in its combined capacity of merchant, proprietor of the soil, and ruler of the State, given its serious attention to the developing the resources of the country. The Government of India had its commercial agents in the cotton-growing districts, whose duties led

them no further than to contract with the native dealers for the necessary supply of cotton required as an investment to China, there to be bartered for tea. No attention was bestowed, or attempted, on improving the quality of cotton, or of introducing any of the appliances for preparing it for the market. The native merchants executed the commercial agents' commission, and as the cotton was furnished so it was shipped to China, and delivered to recognised dealers only, who were licensed to deal with Europeans, who priced it, caring little about its quality or impure condition, and exchanged it, at its real value, for teas destined to be disposed of in London at the periodical sales of the East India Company; hence, in India an organised and seemingly legalised system of fraud and adulteration became a part and parcel of the cotton trade.

The Americans, a shrewd and intelligent people, were not inactive spectators of our proceedings, and while our Government in India, with the monopoly of the trade in its hands, the cheap labour of the country, and its many other advantages, was doing nothing to promote the cultivation or to improve the quality of the cotton, the Americans, by a steady and persevering attention to these matters, gradually extended their cotton trade, and obtained, nearly to the exclusion of India, a complete possession of our markets, a position that America will regain, and ever must hold, so long as the staple of Indian cotton is inferior to that of the Southern States; and, however desirable railways and improved modes of transit and communication may be in India—and no one either doubts or denies their utility—they are, as far as cotton is concerned, substituting the effect for the cause. It is, therefore, unreasonable to expect that the cultivators of India will expend their labour and capital in greatly enlarging their cultivation to produce cottons which are unable to enter into competition with those of American growth, and for which a precarious and fluctuating demand only can exist, to be regulated by the supply depending on causes over which they have no control, and altogether ceasing in seasons of abundance and plentiful harvests in other countries.

The question then is:—" Can India compete with the United States of America? Can India produce that quality of cotton in sufficient quantities of the ordinary descriptions grown in America, which is so extensively required in our manufactories?" It had been long felt that this question must arise, and that the time could not be far distant when it would have to be fairly and maturely considered, but it was not until after the abolition of the trade monopoly that the East India Company—perceiving that it had allowed its opportunity to pass, in having neglected to improve the cotton cultivation, when it had the whole matter in its hands—became alive to the mistake committed, and then, with the best intentions, instituted many experiments for the purpose of retracing its steps; unfortunately, one and all of these attempts ended in disappointment, each having in its turn been prosecuted and abandoned, and not until the year 1842 did any experiment holding out a prospect of success appear. The President of the Board of Control, in July, 1856, thus describes it in the House of Commons:—" That in Dharwar the American cotton had taken so firm a hold that nothing was required to assist it, but that it had failed everywhere else;" yet, strange as it may seem, when so many large and expensive experiments had been injudiciously prosecuted, with a zeal which did credit to the Government, this, the only attempt in Dharwar which had ever been remunerative or held out the hope of success, and the merit of which had been acknowledged by the Government, has met with so little favour from those in authority, and has never been made a basis for promoting the cultivation or improving the quality of the cotton of India in other districts.

The rebellion in America having at length exposed to our view the volcano upon which we had been resting, compelled us in our difficulties to turn to a country which in our prosperity, we had neglected; and that able and lamented statesman, the late Lord Canning, appreciating the deplorable position of the manufacturing interests now so dependent on India, required, previously to resigning his office as Governor-General, that a treatise should be published, setting forth the result and condition of the cotton experiments in India, urging that " an imperfect compilation, which might be available within the next six months, would be far more useful than one which thoroughly exhausted the subject, but which could not be published in a year hence."* Confining my observations chiefly to the Bombay Presidency, had there been no conflicting differences of opinion, had the subject been one of trivial importance, or had the sentiments of those who had most loudly proclaimed that India was wholly incapacitated from producing exotic cottons, not been proved erroneous by the palpable fact at Dharwar, there might have been reason in Lord Canning's directions; but, seeing that facts were daily disproving old theories, it was obvious that a compilation which did not exhaust the subject was a work of supererogation, calculated to do no good, but rather to discourage those schemes which were in progress to improve exotic cultivation; and it might, therefore, have been more judicious not to have published any book than to have presented to the public an imperfect analysis, that revived an agitation on past theories, decided nothing, and reproduced a discussion on a matter upon which subsequent events are now eliciting results, contrary to the conclusions of that or any other compilation from the records of the government, which merely related a history of the lamentable failure of a series of ill-conducted and ill-selected experiments. It must, moreover, be remembered, that the gentleman chosen to make this compilation, does not speak the language of the country, that he did not visit the cotton districts, that he had no opportunity of making personal inquiries, but that he was simply required hastily to compile a treatise, and to draw his conclusions from the documents placed at his disposal; so that, if the evidence was erroneous and faulty, which is the point I hope to establish, it followed that the conclusions based on that evidence would be imperfect and incomplete.

Previously to the year 1842, extensive experiments, by the means of experimental farms, had been undertaken in many parts of the Bombay Presidency; these had all failed, and nowhere more prominently than in Dharwar; yet a subsequent attempt in Dharwar, conducted on an altogether different principle, had succeeded. This is a fact, establishing a flaw in the evidence, upon which the whole presidency had been convicted.

By its own showing, up to the 29th of April, 1843, the government of Bombay held precisely the same sentiments as those promulgated by its authority in 1862, saving that, with the fact before its eyes, it is admitted that exotic cottons may be successfully cultivated to a limited extent in the southern parts of the Presidency; this limited approbation is not defined, and if we may be permitted to extend it beyond the conventional boundary of the southern parts of the Bombay Presidency to the southern portions of the British territory, we at once obtain an area, if not more extensive, little inferior in extent to the cotton cultivation of the whole of the Southern States of America.†

* Resolution of the Government of India, dated 22nd July, 1861.

† The quantity of land in the regions enumerated (in the Southern Peninsula of India) amounts to many thousands of square miles. Taking the four Southern Provinces, Coimbatore, Salem, Madura, and Tinevilly, Dr. Wight estimates these at 4,000 square miles, a mere fraction of India, which might and would annually be under cotton culture in the event of a rise in the price of a farthing per pound.—[Dr. Forbes Watson's paper, read before the Society of Arts, March 23rd, 1859.] The Southern Mahratta, comprising the Dharwar Belgaum, and the Bellary, Guntoor, Cuddapore, and Mangalore collectorates, including the alienated lands not under government assessment, does not contain less than 60,000 square miles.

In a despatch from the Bombay government to the Honourable Court of Directors, dated the 29th of April, 1843,* the government of Bombay recapitulates a long catalogue of expensive experiments, which had been pursued through a series of years in Dharwar, showing that no part of India had received so much attention, nor had such extensive experiments been elsewhere conducted for the purpose of improving the cotton cultivation, yet all had been in vain, and Dharwar Cotton, in 1843, known as Compta, was the lowest priced and the worst in the market. In the year 1861, this same district contained 280,000 acres of American cotton, of which 178,000 acres were growing (according to the diagram prepared and published under the sanction of government), on ordinary Ryots fields, assessed by the collector, and the remainder on alienated lands. The cultivation of the indigenous cotton during the intervening period continued nearly stationary, and it is a circumstance worthy of grave consideration, that owing to the proximity of the growth of these two cottons (the value also of the exotic, leading to its being wilfully adulterated with the indigenous), both cottons have become hybridized, and that although this effect may have lessened the value of the New Orleans, which still† maintained its position at the head of the price current, being on the 12th of November, 1862, 150 rupees per candy, higher than the best cotton in the Bombay market, it had raised the Compta, or indigenous, to an equality with the Broach and Surat cottons. Allowing that it requires seven acres of the New Orleans seed to produce a candy, or 784 lbs. of clean cotton, and that thirteen acres of the indigenous cultivation are necessary to yield an equal amount (the relative prices of the New Orleans and indigenous cottons being as quoted in Bombay at the above date, 560 rupees and 390 rupees per candy), the difference of the value of 280,000 acres of these respective cultivations, taking the rupee at two shillings, would be as £2,240,000 to £840,000, leaving in favour of the New Orleans £1,400,000, to be divided amongst those concerned in India in growing and selling the crop, and manifold more valuable to the Government and country than the whole aggregate of the expenditure which has been incurred in all the experiments throughout India. This might teach those who disparage every attempt to promote the growth and improve the quality of Indian cotton, that if Dharwar, a district formally abandoned as altogether incorrigible, a district in which more experiments had failed than in any other part of India, has subsequently succeeded—that if those measures which had ultimately proved successful in Dharwar had been zealously and perseveringly pursued in other localities, they might have possibly, in those other localities, produced the same results. May we not, therefore, fairly and logically deduce that if the facts upon which the Government arrived at its conclusions were overruled in one place, it is yet to be shown why they are to be accepted as conclusive and correct, under exactly similar circumstances, in all other places.

Examining the reasons upon which the Bombay government pronounced the cotton experiments to be a failure, we find on the public records in an official despatch, dated the 7th of January, 1836, from the late Sir Robert Grant, "That the cotton experiments would not succeed in the Southern Mahratta country, and that the revenue commissioner had made it equally clear that they would not succeed anywhere else," and, subsequently, Sir Robert adds, "that the experiments had been sufficiently tried and failed."* That every attempt to improve the cotton cultivation in the Southern Mahratta, previously to 1842, had conspicuously failed, is undeniable, and by this decree of Sir Robert Grant's, Dharwar, with the rest of the Bombay Presidency, is condemned; Sir James Carnac, who succeeded Sir Robert Grant in the government of Bombay, confirms his predecessor's decision, and assigns his reasons. He states that the experiments had failed because "dirty cotton gave a better return than clean." † Here we have a concise and intelligible view of the question. All experience has shown, without going to India for instruction, that one considerable impediment which has ever stood in the way of effecting reforms, has been, that the continuation of a fraud or abuse has been more profitable to those concerned than the introduction of measures which would check or suppress those practices. From the days of the East India Company's monopoly, the indigenous cotton had been largely and systematically adulterated, and the native dealers in cotton required no one to explain to them, that if a new cultivation was introduced under the auspices and protection of the revenue servants of the district, (provided those public servants understood their duty) wholesale adulteration and fraud must cease; consequently, while we may easily imagine that an innovation of this description would be strongly opposed, and that it was profitable to practise fraud by which dirty cotton was made to pay better than clean, we may not so readily apprehend the procedure of the Bombay Government, in neglecting to take decisive steps to suppress those acknowledged abuses, which were destroying and did destroy a great national undertaking of the largest importance to the commercial interests of both India and Great Britain; for if the good old adage of honesty being the best policy was to be reversed, and dirty cotton was to pay better than clean (and this with the apparent sanction of the government), it would be hopeless to expect that ryots and dealers would sacrifice their individual interests for the public good.

The success of the American cotton cultivation in Dharwar invited renewed exertions to be commenced in Belgaum; and in March, 1850, Mr. Reeves, the collector of that district, reports to Government, "that the New Orleans cotton of Belgaum is in no way inferior, as far as he can ascertain, to that of Dharwar." But, he adds, that the ryots are ignorant, possessing little enterprise, and obliged to trust to the native dealers, who will have nothing to do with it, although he had published through the district the value of the cotton.‡

Mr. Reeves is succeeded by a new collector, who, soon after entering on his duties, expressed an unfavourable opinion of the exotic cotton, attributing its failure in Belgaum to two causes. 1st. "That it is due to its in-

* In saying that in respect to cotton cultivation the Southern Mahratta country had been neglected, &c., we intimated to Mr. Shaw that he had very inconsiderately made a statement which the least inquiry would have shown him was incorrect. He had overlooked, as we observed to him, the fact that for a series of years (from 1830 to 1836) extensive operations were caried on in cotton farms at Segee Hullee and other places, which were plentifully supplied with exotic seeds, while an agency was established for the purpose of purchasing cotton from the ryots in the eastern districts, and several cotton packing presses were erected at Dharwar, Nowlgoond, and Gudduc, all under the superintendance of Dr. Lush, with the view of promoting improvement, not only in the quality of the cotton produced, but also in the mode of cultivating, gathering, picking, cleaning, and packing it in the Southern Mahratta country. We did not deem it necessary to enter into the causes of the failure of the measures in question (nor is it requisite to do so here, as your Honourable Court is in possession of full information on the subject) but we considered it right to intimate to Mr. Shaw that, had he consulted his records, or the public servants on his establishment, he would have learnt that those measures were persevered in as long as a hope remained of effecting by their means the objects in view, and that nothing could be more unfounded than his statement of the Southern Mahratta country having as regards its cotton cultivation, been neglected by government.

† Bombay price current, dated 12th November, 1862, Cotton per candy, of 784 lbs.

Broach and Surat	360 to 375	Rupees
Dhollera	405 to 410	,,
Oomrawattee	365 to 375	,,
Mangalore	365 to 375	,,
Compta	388 to 390	,,
Dharwar	558 to 560	,,

* Revenue Consultations, 1836.
† Page 27 of Compilation of 1861.
‡ Revenue Consultations of 1850.

ferior yield." 2nd. "That, except as an irrigated crop, it will not thrive."*

In regard to the first of these reasons, it is wholly contrary to the result of experience at Dharwar, where, in the year 1844, after a careful analysis, the New Orleans was found to yield from 350 to 400 lbs. of cotton in the Southern Mahratta country per acre; the indigenous, or native, only 220lbs.; the New Orleans also rendering one-third wool to two-thirds seed, the indigenous giving but one-fourth wool to three-fourths seed. Mr. Haywood also, in a letter to Mr. Platt, of Manchester, published on the 1st of February last in the "Cotton Supply Reporter," states the yield of the New Orleans, in the Southern Mahratta country, at 672lbs. seed cotton per acre, which, with better cultivation, might be improved, and that "the native seed only produces half the quantity obtained from the American." For the relative value of these cottons, taking a given quantity of each, I refer to the price current to which allusion has already been made. Whatever may be the scope for conjecture with regard to the yield of the New Orleans, there can be none as to the second cause of its failure in Belgaum, namely, that it will thrive only as an irrigated crop, for, fortunately, the diagrams published by Government decide this question.

The American cotton in Dharwar was never irrigated. We learn also, from the official returns, that the average fall of rain in Belgaum† (rain falling in every month in the year save February), was 46 inches 64 cents., while in Dharwar, the same diagram gives an average of 31 inches 39 cents. Again, referring to these returns, we find the range of the thermometer in Dharwar always to be higher than that of Belgaum, so that the moisture of Belgaum exceeds that of Dharwar, where the New Orleans has succeeded with no irrigation.

On examining the official return‡ of the cotton cultivation of Belgaum, two coincidences appear; first, that the effect of the unfavourable opinions of the local revenue officers was followed by the almost total annihilation of the American cotton culture in 1853; and, secondly, that in 1860 it spontaneously revived before the American difficulties had given an impulse to the cotton trade in India, and at a moment when the indigenous cotton culture in the same collectorate fell off to the extent of 43,388 acres, and that the whole of this revived cultivation occurred in the two talooks of Bedamee and Hoongoond, which a reference to the map will show are the most eastern divisions of Belgaum, and, consequently, the hottest and driest, but, at the same time, adjacent to Dharwar; from whence, probably, the ryots of Bedamee and Hoongoond learnt their experience of the relative value of the respective cottons.

The collector of Belgaum alluded to was an officer of the highest reputation, who has filled with credit and honour some of the most important posts under the Bombay Government. He most unquestionably spoke his convictions; and however he may have formed these convictions, however contrary they were to the facts adduced to support them, he spoke as he believed, probably never having seen a field of American cultivation, or having obtained his information from his native subordinates, who had no inclination to trouble themselves with an additional duty, or from those native dealers whom his predecessor, Mr. Reeves, had reported as having set their faces against the introduction of the American cotton, and who "would have nothing to do with it."

In 1842 the experiment was commenced in Dharwar, not under the auspices of government, but on an entirely new principle, under the influence of the collector, taking the ryots as he found them, and gradually inducing them to adopt improvements. In 1843, the second year of the Dharwar operations, some samples of the New Orleans, and of the indigenous produce, were forwarded for the opinion of the Bombay Chamber of Commerce, and here the experiment, early in its proceedings, met with discouragement, the Chamber of Commerce pronouncing that the native cotton was longer in staple and the most valuable cotton.* In the sixth year of the experiment the cultivation of the New Orleans, which was ever sensitively affected by adverse opinions too readily circulated through the country to its disadvantage, at once fell off from 20,502 acres to 3351,† the cultivation of the indigenous cotton at the same time slightly increasing. The New Orleans, however, in two years, recovered itself, and its cultivation has since gone on steadily advancing, extending by the last official accounts of 1861-62, over 200,000 acres.

Incomprehensible as it may be to understand how the Bombay Chamber of Commerce, at the very outset of this experiment, had formed its unfavourable opinion of the American cotton, it may be more unintelligible to rightly appreciate a subsequent judgment of the merchants of Bombay. In the year 1847, for the purpose of testing the respective value of the New Orleans and native cottons, it was determined by the Bombay government to sell by public auction several hundred bales of each description. Here again public opinion or prejudice was completely against the exotic, the result of these sales was most unfavourable to the New Orleans, the indigenous cotton realising a considerably higher price. This was a humiliating dilemma; as there was no gainsaying the honest opinions of the merchants, which they had freely backed with their money, all further discussion on the matter seemed to be closed. It was, however, destined to be otherwise. These rival cottons were fortunately both consigned to England, and fated to meet again at Liverpool, where a very different verdict was recorded; the New Orleans there sold for 6¼d. per lb., the indigenous for 3½d. This was a most narrow escape, for had either of these trial cottons been shipped to China, or elsewhere, or had they not fallen into the hands of those who were competent to determine their respective values, the fate of the New Orleans, frowned on as it was by the district officials, depreciated and undervalued by the Chambers of Commerce and the mercantile community, would have been sealed for ever. It has never been explained how it was that the merchants of Bombay and the Chamber of Commerce were so lamentably mistaken; it is true that many of the gentlemen composing these associations have never seen a cotton field, and know little of the practical uses to which cotton is applied, and the only reasonable inference is that they were influenced by prejudices, and by certain reports made to the government, under dates of the 28th of November and 12th of December, 1846, in which the opinions of the American planters, who attended the sales in Bombay on the eve of their finally quitting India, were quoted, stating that it was a mistake on the part of the government attempting to introduce the American varieties of cotton into India, observing, to use their own words, "That the staple of the cotton of Western India is as long as that of the New Orleans, and equally as strong, and it is erroneous to suppose that the introduction of the American varieties could be attended with any benefit to India."‡

The result of the sales at Liverpool determined the relative value of the indigenous and American seed cottons grown in India, but there is a stronger testimony in favour of the latter, in the evidence of Mr. Aspinall Turner, the representative of Manchester, who was examined be-

* Revenue Consultations, page 179.

† Pages 212 and 244 of compilation of 1861.

‡ Page 124 of Compilation of 1861.

* Page 133 of Compilation of 1861, and Revenue Consultations of 1844, page 155, containing the collector's reasons for dissenting from the opinion of the Chamber of Commerce.

† Diagram of cotton cultivation in Dharwar, page 160 of Compilation of 1861.

‡ Official Records of Dharwar Collectorate, containing reports of the American planters employed in that district before finally leaving India.

fore a Committee of the House of Commons, in 1848.* This gentleman, a practical manufacturer and consumer of Indian cotton, purchased at Liverpool some of the American seed grown in India, valued at 6½d. per lb., and tried it, weight for weight with ordinary Orleans, which cost 6¾d. per lb., and the result was that the Indian New Orleans produced three per cent. more yarn than the American, and of equal value.† It behoves the British public, therefore, to receive with caution opinions, however honest and disinterested those opinions may be, which emanate from Indian officials, or even members of the mercantile community or Chambers of Commerce in India, on subjects of the details of which they must necessarily have but a very limited knowledge; and, with the partial and imperfect success of the Southern Mahratta in view, bold must that man be who will deny to the southern parts of the Bombay and Madras Presidencies either the capacity or ability to produce the ordinary American cottons of quality and quantity sufficient to supply our wants.

No allusion has yet been made to either Scinde or to the Deccan or Goojerat, extensive provinces of the Bombay presidency, itself only a fifth part of the British Indian Empire.

In regard to Goojerat, a district containing between eight and nine thousand square miles, the most ancient cotton-producing field in India, the government records are loaded with adverse opinions—"The trials at Ahmedabad to be like so many former experiments, a costly failure."‡ "That if the ryots are left to themselves and no unhealthy stimulus is applied, the New Orleans will soon cease to be cultivated."§ In Broach the government saw-ginning establishment was broken up, because no one would use their gins. At Surat the saw-gins set up remained idle. Gloomy and dismal as the official accounts are from Goojerat, I can detect no serious cause for alarm. I cannot observe that any one of the revenue officers displayed any extraordinary zeal or interest in the matter, their time being fully occupied by their magisterial and revenue employments; they looked upon the operations of growing or cleaning cotton as an altogether novel and imposed duty, interfering with their proper and legitimate functions. No attempts were made either to induce the ryots to undertake the exotic cultivation, or to bring it into favour; the process of endeavouring to improve the indigenous plant or to acclimatize the exotic seed, was never seriously considered. An amount of exotic seed supplied by government, whether New Orleans, Egyptian, Bourbon, or Sea Island, or other variety, was distributed without regard to its peculiarity to subordinate native servants, and sown without attention to locality or climate. Sanguine, indeed, must the practical agriculturist have been who could, under such circumstances, have expected to reap a harvest, and little must that man have understood of the character of the natives of India who hoped to overcome their prejudices, and induce them to countenance an innovation under such auspices. I feel confident that if the system adopted in Goojerat had been attempted in Dharwar in 1842 (little as has been done there, and neglected as that little since has been) the result of the Dharwar undertaking would have issued in as signal a failure as those experiments which preceded it in that district, and followed it in Goojerat.

In the concans no cotton cultivation exists, and it is only necessary to say a few words in regard to the Deccan. In the collectorate of Sholopore the experiments were not extensively tried, the natives refused to buy cotton cleaned by saw-gin, assigning as their reason, that it so cut the staple "that the thread spun from it was found to lose all its usual strength." The area of land, according to the official return,* capable of producing cotton in Sholopore is estimated at 2,552,575 acres, of which only 180,600 are under indigenous culture.

Khandeish, according to the late revenue survey reports, contains an area of 12,078 square miles, of which, after deducting for unarable hills, rivers, roads, and villages, 2,306 square miles, there remain 9,772 square miles capable of cultivation, 8,359 of which are waste. In this collectorate in the year 1850-51, there were 7,670 beegahs of American cultivation, regarding which, the American planter in the month of June in that year writes, "He had never seen in India plants so vigorous and healthy-looking." In July he adds, "I never saw better cotton fields in India, they are equal to Louisiana." In August he reported the plants at Chopra and Yawul, which were irrigated in May, "to be in a most luxuriant and promising condition," and that if the whole of Khandeish had been treated in a similar manner, the collectorate "would have been equal to the finest province in the United States;" but he concludes by fearing "the greatest danger is the continuation of the rains." Well, the whole of these brilliant prospects ended in nothing, and the collector subsequently reported that the "excessive luxuriance of the plants and late rains caused the first ripened pods on the lower branches to rot off," and the caterpillars and insects destroyed the rest.† Here, by the collector's own showing, he lost his crop, by the early sowing and irrigating in May. He knew the rains would commence in June and continue till September; had he delayed his sowing (whatever might have been the fate of his crop), he would have saved the early irrigation, and escaped the attacks of the insects and flies, which always prevail immediately at the close of the rainy season, and in all probability he would have gathered an excellent harvest in February or March, or, if even in the month of August (when the planter himself became apprehensive that he had too much forced the cultivation), had he pruned the plants and thus retarded their luxuriance, and counteracted the error, which he began to fear he had committed, he might have preserved his whole crop.

Scinde, from its climate and geographical position, has been compared to Egypt. Colonel Rathbone, an intelligent officer, who was many years employed in a civil capacity in Scinde, writes, "There can be no doubt that the natural fertility of Scinde is pretty equal to that of Egypt. As far as I could judge (and I passed nearly two years in Egypt) the soil is identical; both are in almost the same latitude; both have about the same climate; both produce the same plants and trees, quadrupeds, birds, and fishes; the geographical formation in both is the same, the features in each resembling those of the other in a manner almost ridiculous." Cotton cultivation was only introduced into Egypt by Mahomed Ali in 1821; and in 1859 that country exported cotton to the declared value of £1,113,419, while every attempt to introduce the American varieties of cotton into Scinde has failed. In 1856, Sir Bartle Frere, speaking of the exotic cotton cul-

* I have been a large consumer of Indian cotton for many years, and know the cotton pretty well; it has been a very uncertain supply. When American cotton has been selling at a low price in the market, we have not had an adequate supply of Indian cotton, and when the American has been selling high in the market the supply has increased. I am satisfied, and have been for many years, that the supply of Indian cotton never will be regular until it assumes something like the quality of the American cotton. If we can obtain it from India of a quality a penny a pound more than the Indian cotton generally sells for, so as to enter into competition with the American cotton for all common purposes of spinning, I have long been satisfied that a great revolution would take place in the Indian cotton trade, for it would, instead of being a fluctuating supply, be a constant and regular one; the grower of cotton in India, if he could improve his quality, would be able at all times to compete with the American grower, and an immense supply would be obtained from India, obviously for the advantage of both countries.

† Speech of J. B. Smith, Esq., M.P., in the House of Commons, June 19, 1862.

‡ Revenue Department Compilations, No. 110, 1861.

§ Revenue Consultations of 1848, pp. 139—172.

* Revenue Department, No. 1,169 of 1861.

† Page 93 of Compilation of 1861.

ture in Scinde, says, "That in many places the soil is well adapted for the luxuriant growth of the plants, and that the ravages of insects are the only evil for which a remedy has to be discovered."* Yet Scinde, in 1861–2, did not produce one plant of exotic cotton, while Egypt, with all its plagues of flies and insects, was a large exporting country.

Whether it be profitable or feasible to employ irrigation in growing cotton is not the inquiry. The most valuable varieties of the cotton plant are generally perennial and suited to moist climates, and would, with the judicious aid of irrigation indubitably in India yield two or three pickings in the year. But a system of cultivation, which in one locality may be attended with complete success, may obviously not be adapted to another, as different descriptions of exotic plants require different modes of treatment. Neither does it follow that the longest or most valuable staples are the most profitable crops to cultivate. Nothing, therefore, but a practical knowledge and experience can determine the best course to be prescribed. The ryot may be a creature of habit, adverse and opposed to innovations, content with things as they are, and for these reasons, in order to improve him, we must commence by taking him as we find him, gradually leading him to adopt those changes which, we are quite sure, will benefit him. Our experimental farms, often superintended by persons wholly ignorant of any system of agriculture, as well as of the language, habits, and prejudices of the people, conducted on an expensive scale, at once alarmed the ryot. We are now running into the opposite extreme, and because our experimental farms were completely unsuited to the genius of the native, we are proclaiming, and at a time that we, in England, are daily introducing improvements, that the ryot, as a cultivator of the soil, has nothing to learn. But let an instructor be patient and reasonable, let him be competent to discuss face to face with the ryot, to hear his arguments pro and con, and either satisfactorily refute or confirm them, and he will find, while he is imparting much useful knowledge to the ryot, which the latter will readily and cheerfully receive, that he may himself also learn something; that the ryot is a rational creature, fully apprehending his own interests, not inclined to try experiments he does not comprehend, but ever willing to adopt measures when he sees they are for his benefit. If, then, in the place of expensive experimental farms, the ryots amongst themselves could be induced to see the advantage of keeping their seed pure. acclimatising the most useful description of exotics, hybridizing and improving the indigenous plant, the use of different manures, and the value of exchanging seeds; and if here and there a few intelligent ryots were selected by the local revenue officers for these purposes, and judiciously coaxed to adopt certain views, a popular system of improvement would be introduced, and its advantages would soon be recognised and extend throughout the country.

On the authority of Dr. John William Mallet, who has recently published a learned treatise on the chemical, geological, and meteorological conditions involved in the successful cultivation of cotton, giving an account of the actual conditions and practice in America,† we are told that the physical properties of the soil and subsoil of Alabama, the best cotton field in the States for the green seed plant, appear to be very similar to those of the best cotton soil in India.‡ Speaking also on the chemical analysis of cotton soil and subsoil, he remarks, that in this respect the Alabama specimens resemble many of the Indian soils analysed for Dr. Forbes Watson. The abundance of practical information contained in this volume is too extensive to repeat here. Dr. Mallet points to the resemblance between the black cotton soils of America and those of India, as regards the total amount of moisture contained * in them; he explains the use and necessity of manures, which in India are wholly neglected, and he concludes by saying, that the cotton plant "can bear both great heat and a considerable amount of moisture," and that, "when other crops, including the Indian corn, are drooping under the blazing sun, the large succulent leaves of a cotton field but seem to enjoy the congenial temperature."

* Mr. Charles Kemball, the Collector of Kurrachee, in 1862, states that no part of the Bombay Presidency offers, in his opinion, greater advantages to capitalists than Scinde. There are thousands of acres of land lying waste, capable, with the aid of irrigation, which is readily available, of producing splendid crops of every description. The crops now generally grown, such as jowaree, different kinds of oil-seeds, &c., are perhaps the finest in India. That Scinde would produce cotton similar to that of Egypt, hardly admits of a doubt, and it might be worth the consideration of the Government to introduce a few small colonies of Egyptians for this purpose.

† Dr. Mallett's book.

‡ Page 155.

The area of the Bombay Presidency, exclusive of Scinde, is about 90,000 square miles, and casting out of the calculation the protected native States and alienated lands within its boundaries, and omitting those collectorates in which no cotton is produced, the amount of land, according to the official returns,† cultivated in the year 1860–1, was 18,283,316 acres, of which 1,409,045 were growing cotton. There is no correct statement of the returns of cultivation in the protected independent States, but, estimating the alienated lands, whether service or otherwise, within the limits of the Presidency, as at one-third of the amount of the Khalsat or government assessed lands, which are cultivated in pretty much the same proportion as government lands, the cultivation of the Presidency (still omitting the independent States) may be considered about 25,027,609 acres, 1,998,882 of which were producing cotton.‡

To enter on a description of the numerous land tenures prevailing in India, upon each of which volumes have been written, would be obviously out of place; but as all these systems more or less partake of the zumeendaree or ryotwaree, it may be sufficient to observe that the zumeendar is a landed proprietor, who may be solely, or combined

* Page 164.

†	Amount of land in cultivation.	Cultivated with cotton.		Area of collectorates producing cotton, in square miles.
	acres.	acres.		
Broach	321,591	100,198	From official returns for 1860-61.	1,296
Surat	424,760	78,079		1,292
Ahmedabad	743,716	124,965		4,399
Kaura	994,578	16,482		1,274
Ahmednuggur	2,932,794	6,909		10,078
Poona	1,664,801	8,730		5,298
Khandeish	2,166,640	273,141		16,597
Belgaum	3,248,447	285,583		18,110
Dharwar	1,406,712	388,421		
Sattara	1,994,425	40,516		...
Sholapore	2,385,852	173,021		10,277
	18,283,316	1,496,645		

‡ The amount of lands producing cotton in the Bombay Presidency, and adjoining protected and independent States, may be taken thus:—

	acres.
Khalsat lands assessed by Government	1,499,012
Lands not assessed	499,670
Kattywar	2,000,000*
North and South Berars and Raichore Doab ...	820,509†
Southern Mahratta Jagheer States	107,102‡
Brodera... about	130,000§
Rewa Konta	12,500‖
Kutch (no accounts, but the whole State said to be capable of producing cotton)	...
	5,068,793

No approximate statement of waste lands in the independent States to be relied on is to be found. Col. Davidson estimates that in West Berar and Raichore Doab alone there are 2,198,194 acres, and he has no estimate for East Berar.

* "Compilation" of 1862, p. 229. † p. 217. ‡ p. 228. § p. 229. ‖ p. 230.

with others, responsible for his rent to government, the management of his property depending much on his character. As a general rule, he is a bad landlord, involved in debt, and his ryots or tenants are oppressed. Under the ryotwaree, which chiefly obtains in the Bombay Presidency, the ryot holds his land direct from government, his rent is fixed, and on cotton lands may average three shillings per acre.* He may cultivate what he pleases, but is compelled to pay a portion of his rent in four instalments before he has had an opportunity of realising on his crop—a blot on our revenue system, as it forces him to apply to the moneylender, to whom his crops are mortgaged to a ruinous rate.

However expedient it may be as a political or financial measure to dispose of lands in India, with a view either to create a landed aristocracy, a class of proprietors whose titles to their estates depend on the stability of the British rule, establishing a favourable influence in the place of that which our government has destroyed, or as a means of raising funds to pay off the public debts, the ryot is not likely to redeem his land tax, that he may hold his fields in fee simple, simply because it would not be to his interest so to do. As an expectation therefore of extending cotton cultivation or improving the condition of the ryot, the measure would be a failure, for the lands would soon fall into the hands of the money lenders, who would purchase them on speculation, with the object of raising the rents, and, consequently, obviating all the advantages of the recent reductions of assessment introduced by the revenue survey. But if the government encouraged the sale of zumeendaree estates to persons who had the power of improving them, and placed an upshot price on all waste lands, selling them by public competition, and at the same time declared the assessment as fixed by the revenue survey, to be permanent, refraining from demanding instalments of rent until the farmer had a reasonable opportunity of disposing of his produce, the ryot would feel his independence as the tenant of a liberal landlord; his condition would be improved; he would understand he had nothing to gain by a change of government, and it would be his interest to maintain the tranquillity of the country. There is nothing inherent in the native of India to prevent his raising himself in the scale of civilisation, but in all Oriental countries the government must lead the advance. We hear a great deal of its being the duty of the manufacturers to proceed to India to cultivate cotton, not that such is their duty, for were the whole Chamber of Commerce of Manchester in the present state of India, landed in any of the cotton districts, I have no hesitation in saying (and every practical man conversant with the natives will endorse that opinion), that the only means they would have of procuring a bale of cotton would be through the agency of those very middlemen who hold the ryots in subjection, and who would drive a profitable business also with them. Let the government take the matter in hand and act as any great landed proprietor of this country would do, selecting from amongst its own revenue officers those who, from their knowledge of the languages and native character, would be competent to undertake, in selected districts, the duty. Let them be men who believe, or, at least, hope, that India is capable of competing with America in producing ordinary cottons, and, having this hope, let them have a zeal and perseverance sufficient to meet each difficulty as it may present itself, and be armed with the influence which a revenue officer possesses in his district, holding the confidence of government, with power to reward or remove a subordinate servant, according to his efficiency or otherwise, and a full discretion to aid and assist every European or native capitalist who may desire to settle in his locality, and, at the same time, to confer favours and encouragements on enterprising ryots; if difficulties arise, he will surmount them, or, at least, be able to assign a satisfactory cause for his failure; but do not expect to introduce a great innovation, or to get rid of the abuses of ages, by issuing instructions emanating from a distant authority on an experience not adapted to India, instructions to be carried into operation by revenue officers whose time is fully occupied, without a particle of agricultural knowledge, who must of necessity be guided by the opinions of their native subordinates, persons desirous of escaping an onerous duty, and only too readily influenced by those whose interest it is to maintain things as they are.

If, then, the government, in its capacity of landlord (for these duties in India are inseparable), could be induced to select a few localities as a platform for further trials, proceeding upon principles wholly different from those hitherto attempted, leaving, for the present, the old cotton growing districts to reap the punishment they have brought on themselves, in neglecting the day of their opportunity, and being assured that if India can produce a field capable of competing with America, these districts must, in self-defence, either improve, or withdraw from participating in the profits of the export trade, and if capitalists will follow in the steps of the government, and erect ginning establishments, form agencies, make tramways, &c., &c., there is reason to hope that a new order of things would arise, which would go on extending until it had covered the whole country.

I do not, in pointing to two localities in the Bombay Presidency, desire to limit the operations of the government, for the more extensive those operations, the greater is the probability of eliciting the resources of India. I ask no extraordinary or expensive measure, no plans in violation of the rules of political economy, however much these rules may have been violated in instances where it has been desirable to maintain monopolies. All that is required of the government is an action in concert with the manufacturers of this country, and the adoption of the best and most efficient means of exciting the natives to improve themselves, to the mutual benefit of India and Great Britain.

After all that has been said of the failures in Scinde, I come to the conclusion, that if the experiments in that locality prove anything, it is that Scinde has never had a fair trial, and that as far as experiments have gone, they hold out a prospect of success. The mistake that appears to have occurred in Scinde was the attempt to introduce the green seed cottons instead of the black seed, which are generally, if not always, perennial, and of a more valuable description. In 1857, when Dr. Gibson was deputed to visit Scinde, he reported, "the appearance of the Delta promised very favourable results to the cultivation of cotton."*

Dr. Gibson also remarks, "I would observe, however, that as artificial and constant irrigation is the rule of cultivation in Scinde, and not, as in India, the exception, many varieties may perhaps be profitably cultivated here which have been abandoned in India, owing to the impossibility of cultivating them without irrigation."

The records of the cotton experiments in Scinde present one exception to the long list of failures recorded; a native zumeendar completely succeeded at Mehur in cultivating, in 1847, five acres of New Orleans, which yielded 640 lbs. of cotton per acre, yet subsequent experiments from the same seed failed on account of the attacks of worms. Captain Preedy, the collector of Kurrachee, speaking of the ravages of the insects, says, "If the former be the real cause, the evil might perhaps be pre-

* According to the revised assessments introduced by the Revenue Survey, the following rates may be considered as the average rent of cotton lands per acre:—

Southern Mahratta, including Belgaum and Dharwar	1 rupee, or 2s.
Khandeish	1 rupee 8 annas, or 3s.
The Deccan, including Poona, Sholapore, and Ahmednuggur	10 to 12 annas, or 1s. 4d. to 1s. 6d.
In Goozerat, including Broach, Surat, Kaira, and Ahmedabad	2 rupees, or 4s.

* "Revenue Consultations" 1857.

vented by planting the American cotton at an earlier period of the season, so as to admit of its ripening a month earlier; some good might possibly result by mixing lime with the soil at the time of ploughing, or by afterwards sprinkling it on the young plants. The experiment has never been tried in Scinde, but in England I believe the fly, which does so much injury to turnips, is prevented by these means."*

The collector of Hyderabad, in a letter quoted in the "Revenue Consultations" of 1857, writes—"The Egyptian cotton, which I take to be a variety of the Sea Island kind, seems to be admirably fitted; the hottest weather does not affect it, and the northern blasts of winter, instead of injuring, appear to give it additional life and vigour. It is longer, to be sure, in coming to perfection. The first year it does not yield cotton at all, and the second year but a scanty crop, but after that the yield is far greater than that of the common cotton; the fibre is longer and the texture more silky; there is double the proportion of fibre to seed, and the expense of cultivation would be less." It is manifest that this is the cotton to introduce into Scinde; it would require to be treated as it is in Egypt, and being a perennial, with the aid of irrigation, there is no reason why it should not be as productive and profitable in Scinde as it is in that country, the two countries apparently differing in no other respect than that the one largely exports cotton, which the other is unable to produce.†

For the green seed cottons I point to those districts which are influenced by the two monsoons, comprising the southern peninsula of India, containing an area of land‡ sufficient to supply cottons to an unlimited amount of the description alluded to by Mr. Aspinall Turner, which identical cotton was grown in Dharwar in the year 1847 by an ordinary ryot, contracting with the collector to cultivate it at the rate of three rupees per acre, and consequently allowing that the acre only produced 100 lbs. of clean cotton, it cost on the spot less than three-farthings per lb., and realized at Liverpool 6½d.

I have made no allusion to Bengal or many other regions where cotton is produced, or to what may be the effect of improving the means of transit or communication in India;§ the result of one of many improvements, that of rendering the river Godavery available for irrigation and cheap transit, may give to new and extensive districts a condition of prosperity surpassing any thing we have yet witnessed in India.

These are my reasons for believing that India can supply our manufactories with those varieties of cotton we require,* and that, by a proper and careful procedure India may not only compete with America, but undersell her on her own soil. If I am wrong—if you are satisfied that sufficient has been done in India, that it is not in India to give us what we require—the sooner we turn our attention to eliciting the great resources of our magnificent Eastern empire in some other direction the better. If, on the other hand there is still a hope, still a prospect of success, and the prize is worth striving for, let no failures dishearten, let no difficulties prevent—delays, opposition, prejudice, and even failures—where yon looked for success will meet you; they all occurred in Dharwar; but having maturely and duly considered the matter, and made up your mind that the thing is to be accomplished, and that the success is only a matter of time, fix your time, limiting that time to five, ten, or fifteen years; consider well your plans, adopting some uniform mode of action, and having done this, let nothing daunt you; and if I have any experience of Indian revenue affairs, or any knowledge of practical farming in this country, I have no hesitation in saying that my firm belief and conviction are, that your endeavours will be crowned with complete success.†

* "Revenue Consultations," page 1562 of 1857.

† Major F. J. Goldsmid, many years Assistant-Commissioner in Scinde, now Collector and Magistrate in Kurrachee, writes:—"I may mention that Mr. Commissioner Frere's Report to Government, contained in the public records of the province of Scinde, shows the area of the dependency to be 57,552 square miles; of these, in 1856, there are data to show that about 1,725,000 acres were under cultivation." Major Goldsmid adds, that the cultivation of cotton is but small in Scinde; that it is grown on lands left by river inundation, requiring artificial irrigation as in Egypt. Irrigation is everywhere the rule in Scinde; Major Goldsmid considers the means of irrigation may be greatly extended, and that at present it is insufficient. He gives the average rent of cotton lands to be 1s. 6d. per acre.

‡ A tract of land comprising in this the peninsula of India between 8 and 9 degrees latitude. The cotton cultivation in the United States being, according to Mr. Ellison's handbook, from 6 to 6½ millions of acres, employing about 800,000 negroes, and averaging a yield of seed cotton at 530 lbs. per acre.

§ The Bombay Government, with a laudable intention for which it has never received full credit, desirous of improving the communications of the southern Mahratta country to the sea, has, within the last 25 years, opened roads down several ghauts of upwards of 2,000 feet in height, leading to the ports of Rajpore, Vingorla, Compta, and Mangalore, and has now selected a fifth outlet at Sedasaghud. It is doubtful, however, whether any of these ports holds the natural advantages of Goa, a Portuguese dependency, the nearest to Dharwar, with water carriage to the foot of the ghauts-piers ready made, and a working population at hand, Goa requiring nothing but a liberal Government to rival Bombay, and with this view, a recommendation was made to the Bombay Government, in 1843, to suggest to the Home authorities the benefits which would accrue to Goa and British commerce, if the King of Portugal would declare Goa a free port. Colonel Sykes, M.P., in his notes on public works, estimates that the Ganges canal would yield a direct income on the capital expended on the work at 7 per cent. The Colonel then considers the indirect advantages of this great undertaking, in alleviating, if not wholly preventing, such a calamity as the famine of 1837-38, and observes, that from the increase of land revenue consequent on the extension of the area of irrigation, the direct return from capital may be doubled, which would probably yield 14 per cent. on the outlay. The results of the expenditure of the Madras Presidency in the last five years, the Colonel states, are really marvellous, for the returns, in some cases, gave 133 per cent. upon the outlay.

* The indigenous cotton of India has ever ruled, at Liverpool, about 30 per cent. lower in price than ordinary American, and if in India we can produce cotton of a staple equal to that of the American, and at the same time giving a yield of double the amount of the indigenous cotton, the expense of cultivating both cottons being the same, it is obvious we are conferring a very extensive advantage, and giving to India not only the power to compete, but to supersede and undersell the American cottons. If it be found to be true that there exists in India a locality where the acclimatised seed of the pure American descriptions will not thrive, the process of hybridising the indigenous cotton of that district would not be difficult, and thus a new kind of cotton might be introduced; but no improvement in cultivation will ever change the nature of native cotton, or make it otherwise than native cotton, or transform the black seed variety of the plant into green seed, or *vice versa*.

† The Law of Contract.—It has been always usual for the Government to make advances to Ryots to promote cultivation known as "Tuccavee" advances, but of late years Tuccavee advances have been less resorted to, and some revenue officers have altogether discontinued them as being objectionable. In Dharwar, where the growth of cotton has, within the last few years, been more rapid and extended than in any other part of India, no Tuccavee advances were made to stimulate its cultivation, but at the same time it is only fair towards the advocates of a Law of Contract to say that Government, when making Tuccavee advances, reserved to itself the right of recovering those advances by a summary process, in the same way as current revenue is collected, and charged also an interest on the loan. [Regulation XVII. of 1827, chap. III., sec. XIII.] The Law of Contract is a question that is surrounded with difficulties. [Act VIII. of 1859.] As the law at present stands for the enforcement of a contract, a creditor may bring an action against his debtor at any time, and if he can show that he either intends absconding or making away with his property, he may be arrested or be required to give security for the fulfilment of any decree against him, and, failing in this, his whole property may be attached. The decree may be either for specific performance or damages, and it may be enforced by either seizure of the debtor's propert or by imprisonment. It has also been

enacted by the Penal Code [Act XXIII. of 1861] that whoever cheats, or whoever, by deceiving another person, induces that person to do, or omit to do, anything that causes or is likely to cause damage to that person, is said to cheat, and liable to be imprisoned with hard labour for five years, or fined. The advocates of the Law of Contract consider these provisions insufficient; they plead for a summary enforcement of the law, without its delays or power of appeal. That the Koolkurney, or Village Accountant, should be required to register contracts between the advancer and the ryot, and that on the exhibition of this agreement before a competent authority, a decree should be issued to be followed by summary enforcement. They pray also that numerous Courts for this purpose should be established. The objections to this process are, that the Koolkurney is an hereditary Village Officer, who may be often absent on his revenue duties; his salary is chiefly derived from lands and a per-centage on collections, and is usually very small, and if required to perform this extra duty, it would be necessary to remunerate him or any other person who was so appointed, and, however small the individual salary, in the aggregate it would amount to a considerable expenditure, which would fall on the advancer. The existence of a Law of Contract as proposed, would perpetuate and legalise a system of middle-men and money-lenders which it is desirable to get rid of, and those who advocate this law should reflect, that as the money-lenders at present established, have for generations been in the habit of making advances to ryots, it is probable they would always be beforehand in dealing with the cultivators, and that, consequently, the enforcement of the proposed Law of Contract would place them in a stronger position to oppress the ryots, and remove the European agent to a greater distance from the cultivator than he at present occupies. The law would act detrimentally to all other creditors as giving a priority of claim to a debt registered for a recent advance; it would, therefore, preclude a ryot from obtaining credit on other accounts. A ryot, moreover, in difficulties, may accept an advance on his crops to their full amount, for the purpose of defeating the claims of his just creditors. In a year of admitted failure of crops, a creditor holds a ryot completely in his power, and may dictate his own terms for not enforcing a claim; and, however moderate the creditor may be, if he attempted to enforce a just and lawful claim, the law would become unpopular, while if he did not enforce it, the ryot may think to avoid the payment of the debt by ceasing to cultivate cotton, so that, in either case, the law may defeat the object for which it was enacted. There is no analogy between an advance on cotton and indigo. Indigo is cultivated on large estates belonging to or rented by the planter, and the ryots are more under his control as tenants, he himself, a manufacturer, living amongst them; but the cultivation of cotton is spread over the face of the country in small patches. Unquestionably, as the law now stands it is defective. The distance of the Court, the delays, appeals, and expense, amount to a denial of justice; but there is a remedy to be found in establishing more numerous Courts, with a summary jurisdiction without an appeal, for the recovery of all small debts, limiting this summary procedure to debts incurred within the twelve months, and not executing the decree to the prejudice of a decree that may be in operation in favour of any other creditor, so that a ryot could not with impunity defraud the advancer, nor could an advancer, to the injury of an older and equally just creditor, claim a priority in his own favour. Let the law for the recovery of all small debts be the same, and let the procedure be that which has already been long in practice in large military cantonments, by which the military officer, acting as superintendent of the bazaar, has [Regulations XII., chap. iv., sec. 32] "with a view of providing speedy justice in cases where the amount in dispute is trifling and delay is seriously inconvenient," "authority to receive, try and decide, in a summary manner, pecuniary claims, provided that the sum in dispute does not exceed thirty rupees;" and as decrees against lands and crops can only, by the existing law, be executed by revenue officers, there can be no objection to vesting those officers with powers to the above extent, to summarily decide and enforce a decree relative to advances made on crops by private individuals.

DISCUSSION.

Dr. Riddell said he had listened with much attention to the paper, and a residence in India for upwards of thirty-seven years enabled him to endorse all that had fallen from Mr. Shaw that evening. The latter portion of the paper referred to the capabilities of Scinde as a cotton-producing district, whereas the best part of his own life had been spent in the districts of Berar and Nagpore, where cotton had always been grown to a great extent, and which was regarded as the most favourable district of India for the growth of indigenous cotton. It was true this cotton did not yield a produce equal to the American cotton; but when they considered the cheapness of the rent of the land on which it was grown, and the cheapness and abundance of labour by which it was cultivated, it yielded very good returns. He found, according to information which had been furnished by a friend of his, who was a commissioner in India, that the yield of cotton in 1856-7 was about 70 lbs. per beegah, a beegah being rather less than half an acre. The late Dr. Forbes Royle had calculated the yield at 100 lbs. per beegah. This cotton was certainly of short staple, as compared with the American plant, but it was valuable, and was sold in India at something below a penny per pound. He found that in North and South Berar there were upwards of seven million beegahs of land at the present time capable of producing cotton, and, taking the produce at 70 lbs. per beegah, they would have an annual yield of upwards of a million bales, weighing 500 lbs. per bale. That alone would show them the immense amount of cotton which might be grown in the Nizam's territory alone. With regard to Coimbatore, Dr. White had told them that the American cotton-seed had yielded generally about 800lbs. of cotton per acre, but he (Dr. Riddell) might tell them that within the last month he had received intelligence from a gentleman in Scinde, who had been growing Egyptian cotton for the purpose of exhibiting it for the prize offered by the Government, that the land on which it was cultivated yielded no less than 950lbs. of cotton per acre. Had they anything in America better than that? Samples of that cotton had been sent to the Chamber of Commerce of Bombay, and they were so surprised at the extent of the yield, that they thought it was a mistake. The same gentleman, in 1859–60, cultivated seven beegahs of land near Kurrachee; in the following year he increased the quantity to 16 beegahs, and last year he cultivated 30 beegahs, producing 950lbs. per acre of cotton, which the Chamber of Commerce of Bombay said they had never seen equalled in quality. They compared it to the best Sea Island cotton they had ever seen. If, therefore, such an amount and quality of cotton could be produced in those parts of India where the climate and soil were similar to those of Egypt, what occasion was there to look beyond India for our future cotton supply? He had heard it stated by gentlemen of Manchester, that India was incapable of producing cotton; but they had proof that, with care and attention, 950 lbs. of cotton per acre could be grown there. The climate and soil of Scinde resembled those of Egypt. The rains were to no great extent, and no doubt very much depended upon irrigation; but were they to attempt to grow indigenous cotton on that soil, he had no hesitation in saying that, water it as they would, they would only injure it. Dr. Mallett had confirmed the statement that the soil of Alabama was similar in many respects to that of India; this was the case to some extent, although not entirely, for although the under strata might be moist within a certain distance of the surface, yet this was not generally the case. It was true that when there was an abundance of American cotton in the Liverpool market Indian cotton fetched a lower price, and the result was that the natives would not go on cultivating it, which had led to the supposition that India was incapable of producing cotton. All they wanted was English capital and energy to be carried to India by English merchants. Let them send well qualified men, who would make themselves acquainted with the language of the country. Let them treat the natives kindly, and induce them, by showing them the benefit they would derive from it, to become regular cultivators of cotton. He was quite sure that when it was shown to the natives of India that their own interests were mixed up in the matter, they would be in-

clined, like Englishmen, to do the best they could for themselves.

Mr. Fleming as one connected for many years with the cotton trade of Bombay, would express his opinion that the amount of produce given by the last speaker was very much exaggerated and was the result of estimate rather than of experiment; he believed there were at present very few correct data to go upon with regard to the yield of cotton in India. The probability was that the produce was on an average about half the quantity just given, and even such a yield as that would be very satisfactory. He had listened to the paper that evening with much satisfaction. As a merchant, having had many years' experience in India, he had come to nearly the same conclusions as Mr. Shaw. He was satisfied that in almost every part of India exotic cotton might be profitably cultivated. He believed the government experiments in this matter failed from a want of personal interest on the part of those who made them, and that any future experiments similarly conducted would meet with the same kind of failure. Mr. Shaw had very modestly suppressed the fact that it was mainly through his personal influence and exertions that the New Orleans cotton was introduced into the Mahratta country; and it was a rare thing to find a person in Mr. Shaw's position who would take the same active interest in the matter, engrossed as he was with his public duties. His own impression was that much was to be done by setting an example to the people of India. That being his own conviction, the house with which he was connected were acting upon that principle at the present moment, and two farms were on the point of being established—one in Scinde and the other in the Deccan. He was convinced that the cultivation of native cotton was capable of great improvement. The present system of cultivation in India was very bad. They knew what had been done by the application of skill and capital to the agriculture of our own country, and the immense strides which it had made in consequence, and he was certain that the application of skill and capital to the cultivation of cotton in India would be followed by similar good results. The experiments in progress in the South Mahratta country were still incomplete. It was only with great difficulty that land to the extent of about 70 acres was obtained from the natives. Those 70 acres were divided into two fields of equal extent; one portion was treated exactly as the natives would have treated it, the other portion was ploughed and treated as a skilled English agriculturist would treat it. The experiments were being carried out by a practical English farmer, and the report he had received was, that whilst the field which had been treated upon the native system presented very much the same appearance as the other fields in the same district, that which had been treated upon the English system presented an appearance which was unequalled in the whole locality. Mr. Shaw had suggested that the support of government should be given to individual attempts in this direction; but what he (Mr. Fleming) said was, let the government see to the making of roads and opening out the communication from the interior of the country to the ports of shipment, and let them leave it to individual enterprise to do the rest. If the people of Lancashire desired to do good, let them send out men to India to cultivate cotton. In his own experience he had found the greatest willingness on the part of the government to smooth away difficulties, and the difficulty of obtaining land in favourable positions was the greatest they had to contend with. There was a large extent of waste land in Khandeish, but much of it was unfavourably situated for the growth of cotton, owing to the difficulty of transporting the produce from it. The localities most convenient for the transport of produce were for the most part already occupied. In his opinion, one great bar to progress in this direction was the existence of the present class of very poor peasantry in India, who had neither the capital nor the appliances for improving the cultivation of the soil; and when the capitalist sought to do anything in India, he found a difficulty in getting possession of land except at relatively exorbitant prices. The natives of India had a pride in their possessions, and would not give up their land except at prices very much above its real value. The one great thing they must look to in India was the opening of the great trunk railways, with proper roads communicating with them throughout the interior of the country. They already had a railway opened from Surat to Goojerat, and another in Central India through Berar; but in the South Mahratta country, where American cotton was most successfully cultivated, there was a lamentable deficiency of the means of communication, and there were no good roads whatever. He felt satisfied that until they had railroad communication with the South Mahratta country, the resources of that district would never be properly developed. The crop there ripened late, and owing to the rains could not be exported till the month of April. Probably not more than 5,000 bales could be got away for shipment before May, and the rest of the crop had to remain till October before it could be exported, so that the larger portion of the cotton crop had to be kept back for six months, owing to the want of means of transport. Nor would common roads obviate the difficulty. When the cotton was carried in the common bullock carts of the country, which travelled at the rate of about two miles an hour, it was injured by exposure for such a length of time during the wet season; but with railways and covered trucks the case would be very different, and the produce would be conveyed to the coast in as many hours as days were now occupied in the journey. The great thing, therefore, they had to look to, was the establishment of railway communication with the South Mahratta country, as the only means of opening out one of the principal cotton fields of India.

Colonel W. H. Sykes, M.P., said, the proposition whether India could produce cotton having in his opinion been established by Mr. Shaw, the main question to be considered was by what means the quality of the cotton could be improved. The question had also been raised whether India was capable of producing sufficient cotton for the supply of this country, regard being had to the quality of the article? Therefore the subject resolved itself into these divisons:—viz., could India produce cotton of the different varieties required, and were the inducements to the cultivator sufficiently strong, and would the produce find its way to this country? In the first place, with regard to the capabilities of India to produce cotton, it extended over about twenty-five degrees of latitude, and in this immense territory every variety of soil and climate were met with, so there could be no doubt as to the capability of many portions of it for the production of every variety of cotton. The ordinary staple of Indian cotton was short compared with that which they were best acquainted with in England, but it did not follow that that was the only description of cotton India could produce. Dr. Riddell had shown before the Asiatic Society some cotton grown in Hyderabad, without irrigation, which, in staple was equal to anything which America could produce. His friend Mr. Shaw had shown them that New Orleans cotton could be produced in Dharwar and also in Scinde. At the Statistical Society, a few nights since, were exhibited no fewer than 120 varieties of cotton of different staples produced in different parts of India, and from twenty different parts of the country specimens of cotton of a staple equal to American were shown. Therefore they might make up their minds that India could produce any amount of cotton and of different staples. There was no doubt that cotton of short staple was not adapted for the machinery generally in use in this country, nor was it desired by the manufacturers. He agreed with Mr. Fleming that a great deal was to be hoped for by improved methods of cultivation; but he was afraid the account given them of 800lbs. or 900lbs. to the acre was beyond what they could reasonably expect. He had always understood that 70lbs. per beegah was a good crop,

and that 210lbs. per acre was an extraordinary crop. That was what he gathered from the reports.

Dr. RIDDELL said it was stated in the reports that 800lbs. to the acre had been grown in Coimbatore.

Col. SYKES added that might be from the different mode of cultivation; in cases where the land was ploughed upon the European method the crop might be greater than under ordinary cultivation; but he reccommended them to confine their expectations within reasonable limits to prevent disappointment. Assuming the question, whether India could produce the quality of cotton they required, to be set at rest, the next point that arose was, was there sufficient inducement held out to the cultivators to produce it? His friend Mr. Shaw had spoken of the government as being the proprietors of the soil. They were not so, however, as was proved by the statement of Mr. Fleming, that he had found great difficulty in purchasing land from the native possessors. Twenty-five years ago, he (Col. Sykes) asserted that there was no such thing as the government being the possessors of the soil, excepting as to the waste lands, and he held in his hand a letter addressed to Lord Elgin by Mr. Murdoch, who had travelled through a great part of India, as an independent inquirer, and this was what he said with regard to the proprietory right of the land in the native cultivators:—

The late lamented Colonel Baird Smith has the following remarks in his report on the famine:—"There is no acre of land among the thirty millions or thereabouts forming the total area of the tract on which private rights of various kinds do not exist, and arbitrarily to destroy them is what nobody would think of. Government can only dispose of what belongs to it, and all that does belong to it is the right to sell the proprietary tenure of estates on default of payment of revenue. If there is no default there is no power of sale. The buyer buys the proprietary rights on these terms, and these terms do not imply the extinction of even the humblest subordinate rights. Such rights are quite as precious to their owners as his peculiar holding is to the statesman of the Lake districts, or the yeoman of Kent or Sussex."

From this it was evident that if there was no default on the part of the owner in the payment of the rates and taxes, there was no power of sale on the part of the government. The people of India had a right to cultivate the soil as they liked. There were no stipulations, as was the case in England, as to the rotation of crops. The occupier could grow anything he pleased, and continue the same crops year after year, and the government had no power to interfere. The question was whether it was worth the while of the proprietor or permanent occupier of the land to grow cotton, instead of sugar or other products. At the present prices of cotton in this country, it would be worth their while to grow cotton instead of sugar. He believed the present price of cotton was 2s. 7d. per lb. As long as the prices were high they might induce the cultivators of India to grow cotton, but if the price fell to its former level of 3d. or 4d. per lb., the supply which now came from India, as a sort of spasmodic effort, would decline. In conclusion, he would say he regarded Mr. Fleming's proposition as the most practical one that could be carried out. Let those who wanted a particular kind of cotton from India send persons there to cultivate it. It must, however, be borne in mind that there was an opportunity of obtaining cotton much nearer home. At the late Exhibition a large number of specimens of cotton equal to New Orleans were shown as the productions of Italy. There were sources of supply as it were at their own door, and he thought they were worth inquiring into. He would only add that no doubt India was capable of supplying any amount of cotton, but they would not get the ryots to cultivate it unless they could obtain prices which made it worth their while to do so.

Colonel RATHBONE said, his name having been mentioned in the paper in connection with the subject, one or two observations from him might not be considered out of place. It was well known that cotton grew wild in India; it was an indigenous plant of that country, and the whole of India was supplied with cotton of the growth of that country. Cloth of every quality was produced in England from Indian cotton. The unrivalled muslins of Dacca were produced in India from the same material. They also knew that a large quantity of cotton was exported from India to China. It therefore appeared to him, that if the English manufacturers adapted their machinery to the working of the quality of cotton which was grown in India, they would then be able to use it, and it thus became a question rather for the machinists and the manufacturers of this country than for the cultivators in India. With reference to the various qualities of cotton which India was capable of producing, the remarks of Colonel Sykes were perfectly true. They had in India every variety of climate and soil, and he saw no reason why they should not grow the same quality of cotton as was produced in America if they particularly required it. He could bear personal testimony to the remarkable resemblance between the soil and climate of Scinde and those of Egypt. In both cases irrigation was alike obtained from the snowy mountains. The cotton in Scinde required irrigation; but cotton was not an autumn plant, and to reap the benefits of irrigation, it required that the crop should be matured about September or October. With reference to the inducements to the ryots to engage in the cultivation of cotton, he agreed with much that had been said by Colonel Sykes; but it might be remarked that cotton was something like hops in this country—a very profitable crop if it succeeded, and a very losing one if it failed. A capitalist might engage in that cultivation, because, if he failed in one season he might make his profits in the next, but a season of failure would be absolute ruin to the poor ryot of India. That was one reason, he believed, why they had generally so little fancy for the cultivation of cotton; and he thought, under those circumstances, the only plan by which we could expect to get cotton from India was by the investment of English capital and energy in its cultivation. Whether that should be done by individuals in this country, or by the Government of India, he was not in a position to say; but he thought unless capital was extensively invested in that enterprise we could not look for large and permanent supplies of cotton from that country. He believed it was the same in America. The cotton was produced by enormous expenditure of capital on the part of the Southern slaveholders, who were under large mortgages to the North for the means of supplying that cultivation. If they depended solely upon the ryots in India, he believed their expectations would be disappointed; but if they were willing to invest capital in the enterprise they might have any amount of cotton of every quality they desired.

Sir ERSKINE PERRY, M.P., begged to thank the Society for the opportunity that had been afforded him of hearing a paper and discussion upon, perhaps, the most interesting and important topic that could engage their attention at the present moment, and he had attended that evening with a view to hear what the most intelligent men of the day had to say upon it, as tending to guide the future proceedings of the government on this question. He had made himself acquainted with the results which had attended the experiments of Mr. Shaw, in Dharwar, and he must add his testimony as to the extreme modesty of that gentleman in having kept in the background the great share which he had in the success that had been achieved. But he came there thinking that some attacks would be made upon the government on account of the failures that had been stated to have taken place in the transmission to this country from India of the quality of cotton that was required; because in many parts of England, and especially in those parts most interested in the cotton trade, everybody found fault with somebody or other for what had occurred, and generally it was the government who had to bear the brunt of the abuse. However, there had been none of those attacks that evening; on the contrary, they had heard that the intelligent Governor

of Bombay, Sir Bartle Frere, had given every encouragement to those who had conducted the experiments with regard to cotton cultivation in India. They had that evening heard of three or four—he would not call them panaceas, but stimuli, which ought to be applied to this question. Mr. Shaw had suggested in his paper that what the government ought to do was to seek out from amongst their officers men of zeal, knowledge, and great faith in cotton; men who by the influence of their position should stimulate the ryots to engage in an improved method of cultivation, and by that means encourage the growth of a superior quality of this product. He thought there were several objections to that scheme. Such men were extremely scarce in any service, and probably few men would have done what Mr. Shaw had. The high officers of the government were fully occupied in the administration of justice, and the other duties of government, which, important as cotton was, were paramount to the cultivation of any particular plant. Mr. Shaw was a favourable exception to what he was saying, because, with great activity in his office, he combined a love for, and a practical knowledge of, agriculture, and by that means he was able to exercise a beneficial influence; but even Mr. Shaw must admit that such officers were very difficult to find. It appeared to him that a much sounder principle was enunciated by the gentleman behind him—Mr. Fleming—when he said they must look to individual enterprise to produce the results they desired to see, and by that alone would such results be produced. Then, again, Colonel Rathbone, who was known to him by the great services he had rendered the government in Scinde, had pointed to another order of men whom he considered to blame for the unfavourable results at present accomplished. He had shown that over the vast area of India cotton could be produced to any amount required; but he said if the English manufacturers could not work up the cotton of India, it was the fault of the machines, and not the fault of India in not producing the cotton. It was suggested that by the application of additional capital and improved skill in agriculture they might obtain a better quality of cotton for the English market. Now, he (Sir E. Perry) had had some little experience in farming. He was for some years after his return from India what was styled a gentleman farmer, and, like most of that class, he burnt his fingers by the experiment; and though he was glad to hear that practical English farmers had been sent out to India, and the best kinds of implements employed, he would, nevertheless, venture to express his opinion that expensive farming would not be attended with profitable results in that country. In point of fact, improved farming meant a great additional expense, and the application of capital to the soil; and from all he had heard, with the soil of India under a burning sun, cultivating with improved implements, and putting on manure which had to be imported from a long distance, the results which had been attained as yet were far from profitable. On the contrary, gentlemen accustomed to the modes of cultivation in America had expressed the opinion that, with the soil and circumstances of India, the mode of cultivation employed by the ryots was that which was best suited to that country. At the same time, he had no doubt that such experiments as had been mentioned by Mr. Fleming would be advantageous, even if they failed at first, in affording an example of what might be obtained by improved cultivation. There was one other point to be observed in confirmation of the views he had stated—viz., that it was self-interest alone on which they ought to depend for an additional supply of cotton from India. He agreed with what Col. Sykes had said—that as long as the prices afforded a stimulus, they might expect good supplies of cotton from India; but neither in the paper nor in the remarks of those who had spoken upon it was there any solution of the problem, "Will India ever be in a condiition to supply all the cotton we require in this country, if America returns to her *status quo?*" Col. Rathbone would say, "yes, if additional capital and skill were employed;" but additional capital would necessitate larger prices for the article. Could India, when New Orleans cotton was selling at 5d. per pound, enter into competition with America? He confessed he doubted it. The latest reports from India showed that increased skill had been applied to the cultivation of the soil, but this did not include cotton. The prices which it brought in this country did not stimulate the increased cultivation of that article, therefore he was afraid when America was restored to that peace which they all desired to see established, she would come into competition again with India, and India would go back to the production of those commodities which it best served the self-interest of the people to devote their attention to.

The Chairman, in proposing a vote of thanks to Mr. Shaw for his paper, remarked that he joined in the feeling that had been expressed by preceding speakers, that that gentleman had been too modest in the mention he had made of his own efforts in Dharwar. After the government had opposed his proceedings; after the American planters had declared that the cotton he had grown was inferior to the native cotton; after the Chamber of Commerce of Bombay had expressed the same opinion; and even after the merchants in India had given a higher price for the native cotton than they would give for his, Mr. Shaw persevered in his efforts under a conviction of the superiority of the article he had produced over the native cotton. It was not until Mr. Shaw's cotton reached Liverpool that its real value was discovered. There the native cotton was sold for 3½d. per lb., while that grown by Mr. Shaw fetched 6½d. per lb. Mr. Aspinall Turner, who took a great interest in this question, had worked a portion of the cotton of Mr. Shaw's growth. At the same time he purchased what was called ordinary New Orleans cotton, for which he gave 6¾d., the price of the Indian cotton being fixed at 6½d. Mr. Turner worked up an equal quantity of each description of cotton, and watched them carefully through each process. The result was that the Indian cotton produced 3 per cent. more yarn than the American cotton, and of equal quality. This New Orleans cotton was of a quality similar to the bulk of the cotton generally used in this country, and, therefore, if Mr. Shaw could grow a quality equal to New Orleans, he was able to grow just what this country wanted. Mr. Shaw's cotton, which he sold to Mr. Aspinall Turner for 6½d., only cost three-farthings per lb. picked on the field. Dr. Riddell had referred to Berar as one of the finest districts in India for growing cotton, yet it was only last year that they received any cotton from that district, for although they could buy cotton at Berar for a penny per pound, it was at a distance of 600 miles from the port of shipment, and there were no roads to get it down. It was only when cotton rose to a shilling per pound that the merchant could afford to pay 2d. per pound for the transport of it upon the backs of bullocks; but there was the river Godavery, which could bring the cotton down at a cost of half-a-farthing per pound, if the navigation were opened up. The great advantage possessed by America was in the cotton plantations being situated near the great rivers, and they sent down the Mississippi millions of pounds of cotton for half-a-farthing per pound; and if America paid half-a-farthing and India paid 2d., the article could not be produced upon equal terms. His hon. friend, Sir Erskine Perry, had felicitated himself upon the government of India having escaped blame in this matter in the course of the discussion; but he (the Chairman) thought in the matter of the Godavery, the government ought not to pass scatheless. As regarded the cotton of Scinde, he thought 900lbs. per acre was an exaggerated yield; but suppose they took it at half that amount (450lbs.), that was higher than the yield in America; and besides, it was Egyptian cotton, which was superior to that of America. Then, again, upon the point that cotton could not be grown without irrigation, there was the fine river of the Indus. Why should that be

allowed to run waste to the sea, whilst there were lands on its banks capable of producing cotton without end. He must therefore charge the government with sins of the past. He hoped they would yet come to a sense of their duty; and he was quite sure if his hon. friend (Sir Erskine Perry) had any control they would have no reason to complain for the future. He was sure the meeting would be unanimous in expressing their acknowledgments to Mr. Shaw for his very able paper.

The vote of thanks having been passed,

Mr. SHAW, in acknowledging the compliment, said, comparison had been drawn between the amount of cotton grown in the Bombay presidency and that grown in the United States. He could state that more cotton was produced in that presidency than in the whole of the United States. With regard to the supply to this country, they were told it was entirely a matter of price. To a certain extent that was true, but it was not a matter of price alone. They must have quality, and they had seen all along that the price of Indian cotton had ruled about 30 per cent. lower than ordinary New Orleans; besides that, wherever the New Orleans grown in India obtained a footing in the market it would always be more profitable to grow than Indian native cotton, because the yield of it was double. He maintained that even if the native cotton could hold a footing in Liverpool, the New Orleans coming from India would be the most profitable cotton to grow, and that would be sufficient to create a stimlus for its cultivation. Besides the New Orleans cotton from India produced 20 to 30 per cent. more yarn than the native cotton. Col. Sykes had spoken of the ryots being the proprietors of the land. Did he mean to say that if the government chose to double or treble the land tax they would not have the power to oust the ryot and sell the land if he was unable to pay? There had been a great mistake in this country with respect to the government of India. No government could have been more kind or considerate to the natives than the old East India Company had been, for it was their interest not to oppress the ryots and throw the land out of cultivation. The tax should be definitely fixed, and then the ryot would be safe from being turned out as long as he paid it. It was certainly an advantage to the ryots to get advances; but it was remarkable that in Dharwar no advances had been made. With regard to encouraging manufacturers to send out persons to cultivate cotton in India, little progress would be made unless they received the countenance of the government officers. He did not want the government to grow cotton, but to instruct their officers to afford every encouragement to those who undertook its cultivation. Unless the government gave this kind of aid no advance would be made. The staple and the quality should be improved, so that it might compete with American. Having once done that, there was nothing to prevent them from ousting America from the market, because the rents and cost of cultivation in America were higher than in India.

The Secretary announced that on Wednesday evening next, the 25th February, a paper by Mr. John Cheetham, "On the Best Means of Promoting the Supply of Cotton," would be read. On this evening, Thomas Bazley, Esq., M.P., will preside.

AWARDS OF MERIT AT INTERNATIONAL EXHIBITIONS.

(*Continued from page* 230.)

In August last the Council of the Society of Arts issued a letter, inviting the opinion of the Jurors, the Commissioners for the Colonies and for Foreign countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and requesting replies to the questions given below, with the intention of embodying the answers in a public report.

AWARDS OF JURIES.

1.—Are you of opinion that Awards for Merit, by medals or otherwise, in International Exhibitions, are desirable?

2.—State the reasons for your opinion.

3.—Ought Works of Fine Art and Designs to be excluded from the awards?

4.—Can you suggest any better method than the appointment of jurors for making the awards?

5.—Can you suggest any improvement in the constitution or proceedings of the juries?

6.—Is any appeal from the decision of the juries desirable?

7.—If you think awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?

8.—Have you any further suggestions to offer on the subject?

The following is a summary of the replies received. The figures attached to the replies correspond with those of the questions:—

G. S. WALTERS, South Australian Exhibitor.—1. Yes. 2. The stimulus to enterprise and improvement. 3. No. Those who decline competitive examination might be separated off. 4. Not in this country. 5. Juries in this country for each class, professional or mercantile, should be elected by the parties themselves interested, and only one award of merit in each class. A chairman for each, to preserve order, to be nominated by the Exhibition authorities. The chairman to have no vote; but he may append, or not, his approval of the award. 6. With the consent of the chair, the juries might revise their own decisions once, but no appeal from the decision. 7. Cannot. 8. Yes. The entire work involved in awards is too multifarious and vast to be performed altogether in this country, so as to inspire confidence and satisfaction. Each country and colony exhibiting should be invited to affix its own awards to its own articles in its own way; one award only for one class, Great Britain giving her own awards for her own products in her own way. Every country knows its own difficulties and products, and is the best judge for itself. By such an arrangement the labour would be divided, and the awards more deliberate and careful. Dissatisfaction and responsibility would be removed from the authorities. The public would see and compare the articles deemed best by each country. In case of non-compliance with the invitation, the parties in default should put up with the consequences of the neglect. So much for rewards of merit. In transcendent cases, but only where awards of merit had been given previously, the authorities should reserve to themselves the power to give medals.

E. H. WARD, Exhibitor, Class XXIX.—1. No. 2. The want of justice and failure manifested. 3. No. 4. No. 5. Greater competency on part of juror. 6. Yes, clearly in the present instance. 7. No. 8. Has nothing further to state, and greatly regrets the cause for the present complaint of an ineffective system, fearing lest it may tend to decrease the inclination, and thus lessen the number of exhibitors at any future Exhibition, whether International or otherwise.

ISAAC WATTS, C.B., Chief Constructor of the Navy, Juror, Class XIIA.—1. Awards desirable. 2. Some mark, by which to signify the favourable opinion of competent judges, is due to the exhibitors, and cannot be otherwise

than acceptable to the public. 3. Works of fine art and design should be excluded from the award. 4. Nothing better suggests itself. 5. No. 6. Thinks not. 8. Not any.

A. Westenholz, Consul-General and Commissioner for Denmark.—1. Medals and honourable mentions accomplish the object desired. 2. This opinion is based on a conviction that awards of this nature attract foreign exhibitors. It is a fact that the majority of these do not exhibit with a view of finding a foreign market for their articles, and even many of them would be unable to supply a demand. This numerous class hope, by receiving such a distinction in a foreign country, to establish thereby a reputation for their home trade. 3. Classes 37 and 40, viz.:—Architectural models and designs, and etchings and engravings, might, with advantage, have awards granted to them, but classes 38 and 39, viz.:—paintings and sculpture, ought to be excluded. Thinks it would not be possible to form a jury competent to give anything approaching to satisfaction. 4. Properly constituted juries appear the only system through which awards can be granted. 5. An efficient plan for the organisation of juries has not yet been adopted. In general each jury has been too numerous, and while it may be said a few members only do the real work, their responsibility is diminished, and, as it were, screened by the great number of non-acting members. A reduction in the number of jurors, therefore, seems essential, and only such members as will really act should be elected. Would also suggest the advisability of providing each jury with a secretary, who, by payment or otherwise, should be held responsible that every article in his class was carefully examined. Instances would then not be so likely to occur of articles being passed over, although attention had been called to them, as experience proves has often been the case. The council of chairmen of juries, consisting of 36 members, although well adapted for laying down general rules, &c., seems too numerous to consider and ratify the awards of the jurors; the work they have to get through being so extensive, it is impossible for them to enter into details. Thinks great benefit would result from a subdivision into sections, say, for instance, into three, in the same manner as the first 36 classes of the present Exhibition. Each section would be thereby enabled to give its undivided attention to its respective classes, and the number would still be sufficiently large to give full weight to its decisions. To the aid of the councils of chairmen should be called the chief foreign or acting commissioners in as far as regards the awards to their own countries. This would prevent a repetition of such mistakes as giving prizes to exhibitors whose names appeared in the catalogue but who failed to exhibit. The intimate acquaintance which these gentlemen must be supposed to possess of their own manufactures, and their local knowledge, would, it is evident, enable them to supply the council with such information as ought necessarily to have considerable bearing on the various questions under consideration. With regard to the awards to the country where the exhibition is held, the appointment of a special commissioner, to act in a manner similar to the one suggested respecting the foreign commissioners, might also prove beneficial. 7. If, as suggested, the council of juries were divided into sections, and the foreign commissioners invited to act, sees no necessity for appeal, but should a court of appeal be considered desirable, it would be easy to constitute such by a full court of the council. With the constitution of juries and council of chairmen as at the present Exhibition, experience seems to prove the absolute necessity, for the sake of giving satisfaction as well as doing justice, to have such a tribunal, but the constitution of it would be most difficult, as it would be impracticable for it to consist of a larger number of members, and it would appear anomalous for a smaller body to upset the decisions of both the common juries and the council of chairmen. 8. Although different modes of constituting juries might be suggested, it would be advantageous to modify the system, though founded on precedent, if it could be thereby rendered efficient. The suggestion to form the juries entirely of members of the country in which the Exhibition is held is not desirable, as it would deprive the Exhibition of much of its international character, and exclude that co-operation and intercourse between eminent men of different countries which forms a most interesting and striking feature.

Whitby, Brothers, Exhibitors, Class XXVIIc.—1. Undesirable. 2. *a.* Because the expectation of a prize encourages exhibition by dealers rather than actual producers. To the former the prize and its advertising value are the main object; to the latter they are of no importance, but the knowledge that they are equally attainable by himself and the general dealer (who may employ them to his actual disadvantage), destroys his faith in the professed objects of the Exhibition, and disinclines the manufacturer and producer from connection with it. *b.* The consequent division of the exhibitors into two classes, those who are mainly desirous of assisting to carry out the original scheme of "Exhibition," and those who show for their own personal advantage. *c.* The impracticability of obtaining a jury which is qualified and impartial; the interests of the two classes of exhibitors referred to not being identical. *d.* Because, presuming the award to be impartial, infallible, adapted to introduce "meritorious productions to the notice of the public," and of equal real value to all classes of exhibitors, it could not be made in favour of one without injury to others. 3. Works of fine art and designs are peculiarly unfit to be the subjects of competition for "prizes," because there is no indisputable standard of taste in such matters, and exhibitors would not be willing to accept the judgment of any critic or jury. An award of merit should be superfluous if proper precautions are taken to exclude meretricious productions from the privilege of exhibition. 4 and 5. Object to the constitution of juries by any means or on any conditions, but suggest a reference to the working of those appointed by the Agricultural Societies. Believe that the jurors there are kept in ignorance of the ownership of the objects submitted to them. This regulation could not be enforced in International Exhibitions, but it shows the impossibility of obtaining a reliable and impartial verdict, for even after this precaution the awards are practically little regarded, especially those for machinery, which offers the best parallel to the contents of International Exhibitions. 6. Yes; on production of reasonable evidence of oversight or error, not on general grounds of dissatisfaction. If the principle of awards be recognised it must be supported. 7. Think awards unnecessary as well as undesirable. The public are the best judges of their own requirements, and are not slow to discover and appreciate real merit. They are as likely to be misled as to be assisted by any efforts to guide their judgment; and more likely to challenge than to respect the decisions. Refer for confirmation to the public comments in recent instances. 8. Suggest, especially in the industrial departments, the strenuous encouragement of actual producers as exhibitors.

Geo. Fergusson Wilson, F.R.S., Juror, Class IVa.—1. Believes "awards of merit" necessary to the success of international exhibitions. 2. Had seen enough of the difficulties in awarding the medals in 1851 in London, and in 1855 in Paris, to make him join this year's jury with a very doubtful feeling as to prizes; what he saw during the work, however, satisfied him that the present one medal and commendation system worked very tolerably well. Had afterwards several conversations with foreign jurors on the subject, who gave it as their opinion that their compatriots would not exhibit were there no prizes. Believes exhibitions held in England are supported in great part by those who utterly dislike them, and who would gladly escape the trouble and expense of exhibiting, but dare not be unrepresented. Believes that exhibitions without prizes, however much credit the arti-

cles exhibited might gain from the actual visitors, would not sufficiently answer the exhibitor's purpose. The value of a medal to a manufacturer is greater abroad than at home, and the value at home continues after the exhibition is closed; placed on the heading of his invoices and on labels on his goods—it carries a sort of prestige of merit. On the whole, he thinks the present system of limited medals works fairly well; that it would have been much better had it been possible to have the three grades of medals—the great gold, the gold, and the ordinary medal—so as to stamp the degrees of merit, but that, at least with "mixed" juries, the immense difficulties of arriving at just decisions on comparatively fine points, out-weighs the good, and that the present system of awarding medals to every thing of decided merit, though it involves giving so many medals that they convey no distinction to the heads of industries, yet gives a rough sifting which is some guide to the public, and satisfies exhibitors sufficiently to make them go on exhibiting; and that as exhibitions, with all their short-comings, do, as a fact, lead to great advance in manufactures, this is the main object to be arrived at. 4. Cannot. 5. Thinks it most important to choose as jurors men who have seen something of previous exhibitions, as otherwise, however well qualified they may be by scientific or technical knowledge to form correct judgments, they have much greater difficulty in acting satisfactorily with their colleagues, more especially with foreign ones. 6. Does not think good men would serve as jurors, if their awards were liable to reversal. 7. Does not think awards undesirable. 8. Thinks the very greatest care should be taken to get the best possible reporter to each class, and to have the fullest possible report. In the industry the writer knows best (the stearic acid candle manufacture), he can speak to the fact that the reports, both of the Exhibitions of 1851 and 1855, have been of the greatest practical use, leading to many improvements in manufacture—directly, by the knowledge they themselves promulgate, and indirectly, by serving as text books to writers of treatises on manufactures, both abroad and at home. Thinks clearer rules might be laid down as to what class of objects are qualified for medals and what for honourable mention; in his section of Class IV. there was a rule that articles such as raw or almost raw products from the colonies, though excellent, as they had not involved any considerable degree of skill or manufacture, could only have honourable mention; in other sections, believes other rules existed.

H. DRUMMOND WOLFF, Commissioner for the Ionian Islands.—1. Most assuredly. 2. It is easy to understand that, in a large country like this, a medal is but of small advantage, especially to great producers. The standard of merit for a medal is comparatively a low one. Merit above that standard is waste. The works exhibited by great firms are too far above it to make the medal of any value to a reputation already established. This class of producers would, therefore, prefer to trust to the report of a jury, to the press, or to public suffrage. Their goods are sought for by the highest classes of the most civilised communities. It is clearly for these no object of ambition to obtain a medal that may seem almost to reduce them to the lower level of producers exhibiting articles immeasurably inferior. But the question is very different for small producers in small countries. In the Ionian Islands the news of the awards has not only given the most lively satisfaction, but has wrought a sensible and immediate benefit. It has forced on the producer, by palpable evidence, the belief that his productions possess some value. It has thus already given an impulse to industry and enterprise with a rapidity and efficacy which no written report could achieve. In great countries there exists a public opinion and a public press. These institutions do not extend to smaller communities. Reports of juries, even if translated into every living dialect, would be read and appreciated only by nations in an advanced condition of civilisation. In various countries the producer himself, a small cottier, often cannot read. Such is the case with many of our Ionian producers who have obtained medals. If, by some chance, the producer himself can read, his customers and neighbours do not boast that acquirement. A medal tells its own story to every one, lettered or unlettered. In the Ionian Islands the medals will be handed down as heirlooms, and will fix the date of a first and not unsuccessful competition in the arena of human industry. It will turn the reluctance to exhibit hitherto shown into eagerness and emulation. The object of international exhibitions is to bring forward new industries and to open fresh markets, quite as much as to reward and stimulate arts and trades already successfully established. This object would be wholly lost, especially in colonies or in backward communities like those of the East, if acknowledged merit were not to obtain some indisputable token of recognition. 3. See answer No. 8. 4. Can suggest no better method. 5. The juries should be composed entirely of persons unconnected with trade. At the present day amateurs can be found competent to form a sound judgment on branches of industry, however scientific. Experts might be added as assessors, but without a vote; nor should they be present during a division. The juries should be smaller in number, and their labours should extend over a longer period than that allotted to them on the present occasion. Notices of their meetings should be posted at different points in the Exhibition building, and no object should be examined without the presence of the exhibitor. 6. Only in favour of an exhibitor whose works have been accidentally overlooked. 7. Would substitute a smaller medal for the honourable mention. 8. While he maintains the opinion that awards are indispensable to the utility of an international exhibition, the present system appears open to great improvement. The chief objection to a gradation of awards lies in the invidious nature of the task thus devolving on the jurors. To this it may be replied, that jealousies are created by the distinction established between "medal" and "honourable mention," and that, nevertheless, a further gradation has been introduced by some of the juries by adding the term "high commendation" to the award of a medal. But if jealousy be anticipated from the classification by the judges of the products submitted to them, this feeling could hardly be raised if the classification were effected by the exhibitors themselves. As in universities candidates enter themselves for particular prizes, so should exhibitors be called upon to declare beforehand in which class they intend to compete. Of these classes there should be three, each with its medal (gold, silver, and bronze), and with its "honourable mention," or smaller medal. By this method a producer would be satisfied with the species of award allotted him, as not competing with exhibitors eminently superior or inferior to himself. The details of such a plan, though too long for the limits of suggestions like the present, might be reduced to simplicity. This answer includes that to query No. 3. Though the allotment of awards to works of Fine Art and Design is of questionable policy, and in the case of great masters absolutely impossible, the writer would not exclude smaller artists and communities from the benefits to be derived from an examination by competent judges of artistic works, should the producers themselves desire it.

CHARLES WOOLLOTON, Juror, Class IIIA.—1. Yes. 2. Without some prospect of honorary distinction, or preference, it would be very difficult to obtain exhibitors, even among manufacturers, producers, or wholesale traders, who alone should be admitted to exhibit. 3. Should be admitted. 4. Cannot. 5. Was a juror in Class III, section A, and joint secretary with Baron Riese Stallburg to Class III., and from his experience on that occasion, thinks juries should be more sub-divided, have less subjects referred to each jury, and be composed of fewer members. No jury should exceed seven, nor be less than three, and if three, the decision should be unanimous. Thinks that before each juror accepts the office, he should be asked to state in writing, whether he has, in any previous

international exhibition, acted in the capacity of juror, and if not, whether he considers himself conversant with the relative merits of the goods, produce, or other objects on which he will be called upon to pronounce an opinion. 6. Thinks not.

George Wright and Co., Exhibitors, Class XXXIa.—1. On the whole, undesirable. 2. Because exhibitors are mostly persons already well before the public, who, as a rule, may be relied upon as their best and truest patrons. 3. The preceding remarks apply equally to this question. 4. No; an English jury is popular, and may generally be relied npon. 5. Many improvements in their "constitution," if the juries of 1862 are referred to; but chiefly that they should be composed of persons having knowledge of, and no interest in, the matters upon which they may be called to adjudicate. To this end some system of challenging might be introduced, which, under proper restrictions, would be a great protection to the competitors. With respect to their "proceedings," if their constitution had been good, their proceedings would have been better. 6. From the decision of a well-constituted jury, probably no appeal would be necessary, except in cases of error. 7. The best way "to bring meritorious productions to the notice of the public" is to place them before the public, and let their merits speak for themselves. 8. None, except to remark that this firm is entirely dissatisfied with the awards in Class XXXI., in which it exhibited, inasmuch as the jury in this class awarded medals to parties for goods of which they were not the producers, but which were manufactured for them by one of the jurors of Class XXXI., and the president of the section in which this class is included, and whom, if any system of challenging had been permitted, this firm would never have allowed to remain upon the jury.

William Young (Young's Patent Type Composing and Distributing Machine Company), Exhibitor, Class VIIa.—1. Not if made according to the present method. 2. Firstly, because the present jury system is often very irregular, not to say partial, in its action, as the following instance will show. It is the case of an exhibitor who received no notice of the intended visit of the jury, unless an hour's verbal one, given early in the morning to his assistants in the building during his absence, can be considered such. A notice of the same kind having been given about a week before, and not having been followed by the visit, as intimated, the exhibitor in question called at the office of the jury and requested that he might receive a written, or, at all events, a timely notice of any similar intended visit; but the secretary stated, in reply, that no written notice could be given, and this, notwithstanding a rival exhibitor had received a week's written notice for that purpose, and had, accordingly, the opportunity of giving every necessary explanation to the jury, which was virtually denied to the first-mentioned exhibitor. Secondly, because awards have repeatedly and obviously failed to recognise superior merit, and have, therefore, in every instance of the kind, been unjust in their operation and injurious in their results, as tending to diminish, if not to destroy, the good effect of other awards, besides proving, perhaps, a serious obstacle to the progress of some useful enterprise, by tending to mislead public opinion on its merits. It is, however, not surprising that a system which admits of the exercise of functions, over which public opinion, from want of information, can have no control, until too late to be of any immediate use, should fail to accomplish the object in view, and be the cause of such universal dissatisfaction. It is, moreover, impossible that any body of men, however well informed, can possess all the special knowledge required to enable them to exercise their functions with every possible certainty of arriving at a just decision in all cases. It is true they may obtain the opinion of others who are practically acquainted with the subject that may happen to be under consideration, but the necessity or advantage of obtaining such counsel, is an additional proof of the irregular and irresponsible exercise of their functions, since they can avail themselves of an authority to bias their verdict, which is totally unknown and still less recognised by the exhibitors or the public. 8. Venture to suggest that greater publicity should be given to all deliberations affecting awards. This end would be best attained by adopting the same mode of procedure as is followed in the civil law courts; that is, a public tribunal, presided over by a judge, to recapitulate the evidence to a jury, the individual members of which, however chosen, might be challenged by any exhibitor, under examination. This method would guarantee a fair hearing to every candidate, and enable the public to form its own opinion on the merits of each particular claim, irrespective of any decision of the jury. To promote the efficient working of this plan, it would be necessary to increase the number of classes, and arrange that each should have its distinctive tribunal, which should sit permanently during the continuance of the Exhibition. It appears to me that each of these tribunals would form an additional attractive and instructive feature of the Exhibition; for many interesting questions would be discussed before them, and visitors to the Exhibition would naturally resort to them in order to obtain the most reliable information which such discussions would necessarily elicit. These industrial courts might indeed become permanent institutions of the country, where every element of progress might at all times receive encouragement, as well as a discriminating acknowledgment; and no better or more appropriate use could be made of the hall proposed to be built to the memory of Prince Albert than to devote it to the sessions and requirements of such tribunals.

The following were omitted in their alphabetical order:—

J.W. del Campo, Delft, Holland, Honorary Corresponding Member of the Society of Arts.—Has been constantly at the International from the first pile that was driven for the erection of that great undertaking until the last package that was returned to its zealous proprietor, and has attended the juries at their examination in the Dutch department. 1, 2, 4, 5. The object of exhibitions must be to compare the improvements of several products of manufactures; as the manufacturers themselves are in general too much interested in the products of their inventive minds, the Jury should be nominated of non-interested, not professional men. The question is not what the articles are made from, but what is their quality, use, utility, and price. A close examination, therefore, of every exhibited object is necessary in order to arrive at a right conclusion, where a wrong conclusion is injurious to the industry at large. Thinks there is not one who is acquainted with the working of the juries that can be of opinion that, in the limited time that was given to them, they have been able to judge correctly of many of the articles exhibited in the several classes. Many things were not examined at all; others not known to several jurors; and if that be the case, awards do more harm than good, and, for future exhibitions, the writer would propose that they should be only of a special class of objects. The jurors should have time and an opportunity to examine closely every exhibited article. An appeal from their decision should be possible, as the jurors are as liable to mistakes as any other men, and further inquiries and communications may lead to better conclusions. Rewards should then be given for those articles only which have the best commercial value and utility, to the manufacturers and not the inventors. For inventors special rewards should be given. Machines in general and engines should undergo a thorough trial; they do so in agricultural shows—why not in general exhibitions? 3. The Exhibition of Paris in 1855 has proved that awards of merit are unsuitable for the purpose. In this class there is still more confusion about the merit of a thing than in the objects of industry.

JOHN LEIGHTON, F.S.A., Exhibitor, Class XXVIII., XXXVIII., and XL.—1. Yes, if by medals in degrees of merit, and less lavish than in the Exhibition of 1862. 2. Awards to merit as incentives to exertion might be made highly beneficial both as guides to purchasers and the public. By foreign exhibitors they are greatly esteemed, and it is doubtful if they would send without some such stimulant. 3. No. Works of fine art ought not to be excluded. To give rewards to the moiety of a universal exhibition devoted to the whole arts is not just or possible. The fine and industrial arts are so blended that in many cases they are not to be separated or estranged, were such a course politic, and that certainly is not the feeling of the present day. Artists, painters, architects, engravers, and sculptors, have in many cases received reward from the international juries. This question is not one to be lightly answered by a "No," or "Yes," from exhibitors of raw materials, mechanics, manufacturers, or scientific men, but by artists and corporations of art upon mature consideration. The feeling of the British artist is decidedly against reward in the form of medals. but the opposition rests solely from the presumed difficulty of finding judges free from bias, or rather with a bias founded upon reasons clear and defined. The continental artist regards the non-estimation of medals by us as due to a fear of competition with him in a walk in which he is superior, and believes to extend to all departments of art—save perhaps water colour. 4. No; great care should be taken in the selection of jurors by the universal vote of exhibitors, they being associated with men celebrated in science and art, as a check against trade influences which are not so lofty in their aspiratious. No juror to be nominated in a sub-class if an exhibitor in the class. Jurors to receive medals of office to rank as prize medals. 5. Not having the proceedings or constitutions of the juries at hand, cannot say, but would have the special commissioner an able man, well acquainted with the department in science or art over which he is placed (an exception in 1862, not the rule); he should be responsible for the legality of the awards and the process and laws by which they are governed; he should serve as reporter, and be able and willing to defend the acts of his jury upon neutral ground, responsible alone to a council of chairmen. The special jury commissioner of a class should know names from things, and indeed both; he should see that the jurors are fit, learned men, and prompt in attendance, and that they be not exhibitors in a class or sub-class of the section. A trade is often divided into sub-classes, a man competent in one division serving in another of which he knows nothing, with a hope of benefiting his connections without damaging his interests. For instance, a papermaker may know nothing of printing, and *vice-versa*, a bookbinder less of type-casting or founding, yet all are in the same class and have acted indiscriminately. 6. No; a court of appeal not desirable, though highly necessary to prevent acts of injustice and rectify errors. 7. Awards are only undesirable from their maladministration; the trade reports are meagre and biassed, the medals being rewards to the exhibitors, and the reports to the jurors, instead of honour to the class products. The reports and medals should be distributed together at the close of the exhibition, prior to a fortnight's leave of sale, the special commissioner preventing the sale of goods other than those submitted to the juries; such should on no account be permitted to enter the building. As a souvenir of the event, an exhibitor's medal could be given, as in 1851. 8. In future exhibitions classification of goods ought to be attempted, and it is hoped will be in 1872, should we not be forestalled by the French in their next great gathering. Medals ought to be fewer and various in degree, awarded in less haste, with greater care, and under the supervision of special commissioners with special accomplishments.

Home Correspondence.

THE SUBMARINE TELEGRAPH.

SIR,—In the letter which you did me the favour to insert in your journal of Friday last, there occurs one error of the press, which, though apparently minute, is important as affecting the sense.

The mistake may well have arisen from the indistinctness of the original writing, and the hurry in which I wrote. The words "*gravel* bottom" in the last paragraph of my letter should have been the "*general* bottom," and the immediately preceding paragraph shows that the bottom, so far as the soundings have been completed, consists not of gravel, but of soft material, called by sailors "ooze."

As in the elucidation of scientific facts preliminary to action in completing our great work, perfect accuracy is important, you will oblige me by inserting this letter also to prevent any misapprehension on this point.

I am, &c.,
STUART WORTLEY.

Atlantic Telegraph Company,
22, Old Broad-street, E.C., February 16, 1863.

SPECIAL GENERAL MEETING.

SIR,—There is an error in the report of my remarks on the 7th instant, which it may be important to correct. I am made to say that the Society, since its foundation, "had *awarded* no fewer than 20,000 premiums;" I gave that as the number which had been *offered*, and observed that about one *quarter* of the number (say 5,000) had been awarded.

It may be interesting to add the following, as pretty nearly a correct classification of these premiums:—

	Premiums offered.	Premiums awarded.
Agriculture	7,206	577
Chemistry	2,566	129
Fine Arts	4,274	2,658
Manufactures	1,447	335
Colonies and Trade	3,173	368
Miscellaneous	95	55
Mechanics	1,239	878
Totals	20,000	5,000

I shall feel obliged by your inserting this in the next number of the *Journal*.

I am, &c.,
J. H. MURCHISON.

Surbiton hill, Kingston-on-Thames, 16th Feb., 1863.

To Correspondents.

ERRATUM.—In the *Journal* for the 16th January last, page 151, col. 1, line 13 from bottom, before "awards" insert "no."

MEETINGS FOR THE ENSUING WEEK.

MON. ...R. Geographical, 8½. 1. Dr. H. Rink, of Greenland, "On the discharge of Water from the interior of Greenland, through Springs underneath the Ice." 2. Captain Millington H. Synge, R.E., F.R.G.S., "On Rupert Land."
British Architects, 8.
Actuaries, 7.
Medical, 8½. Mr. Thomas Bryant, "On the Diseases of the Osseous System, and on Tumours, &c."
Royal United Service Inst., 8½. Mr. Benjamin Sharpe, "The Errors incidental to Ships' Bow and Broadside Guns."

TUES. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. 1. Mr. J. R. Mosse, "On American Timber Bridges." 2. Mr. W. Fairbairn, "On the re-construction of the Dinting and Mottram Viaducts."
Zoological, 9.
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."

WED. ...Society of Arts, 8. Mr. John Cheetham, "On the Best Means for promoting the Supply of Cotton."
R. Soc. Literature, 4½.
Archæological Association, 8½. 1. Rev. E. Kell, "On the Recent Discovery of Ancient Remains in the Isle of Wight." 2. Mr. Syer Cuming, "On Ancient Nielli."
R. Horticultural, 1. Hyacinth Show. Floral Committee, at 10. Fruit Committee, at 10.

THURS...Royal, 8½.
Antiquaries, 8½.
Philosophical Club, 6.
Artists and Amateurs, 8.
Royal Inst., 3. Dr. E. Frankland, "On Chemical Affinity."
FRI.......Royal Inst., 8. Mr. John Lubbock, "On the Ancient Lake Habitations of Switzerland."
SAT.......R. Botanic, 3¾.
Royal Inst., 3. Prof. Max Muller, "On the Science of Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, February 13th*, 1863.]

Dated 15th October, 1862.

2788. R. A. Brooman, 166, Fleet-street—Imp. in refrigerating and freezing, and in apparatus employed therein. (A com.)

Dated 12th December, 1862.

3329. J. E. Roussel, 15, Passage des Petites Ecuries, Paris—Imp. in hand and power looms for weaving. (A com.)

Dated 16th December, 1862.

3363. R. Schomburg, Onslow-terrace, Lorrimore-road, and A. Baldamus, Surrey-terrace, Lorrimore-road—Imp. applicable to all kinds of oils used for illuminating purposes, whereby combustion thereof is rendered more perfect, smoke prevented, and the purity of the light increased.

Dated 20th December, 1862.

3403. F. W. Harvey, High-street, Putney—Imp. in fitting and connecting rudders to ships and other floating vessels.

Dated 10th January, 1863.

80. L. H. E. Lepreux, Bordeaux, France—Improved plates or slabs for preserving apartments from the effect of damp, and which are also applicable in the composition of plinths and foundations for walls. (A com.)

Dated 12th January, 1863.

95. W. Clark, 53, Chancery-lane—Imp. in winding or copping frames. (A com.)

Dated 15th January, 1863.

137. J. P. Bath, Aigburth, near Liverpool—Imp. applicable to omnibuses and other like carriages, to adapt them for use on rail or tram roads, as well as common highways.

Dated 20th January, 1863.

166. A. Paul, Gwennap, Cornwall—Imp. in obtaining reciprocating motion in steam engines, and for communicating the same to any ordinary pumps, for whatever purpose they may be employed.

171. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in colouring, bronzing, and preserving iron and steel. (A com.)

173. W. Clark, 53, Chancery lane—Imp. in looms for weaving textile fabrics. (A com.)

174. J. Smith, Barkeley-house, Seaforth, near Liverpool, and S. A. Chease, Egremont, near Birkenhead—A new description of motive power engine.

Dated 21st January, 1863.

181. J. M. Kirk, Halifax—An improved method of, and means or apparatus for, finishing textile fabrics.

183. J. Holt, Oldham—Imp. in willowing and opening cotton and other fibrous substances.

185. W. Clark, 53, Chancery-lane—Imp. in preparing and obtaining photogenic pictures or representations. (A com.)

187. E. Bazin, Angers, France—An improved log.

189. Sir C. Lindsay, 11, Grosvenor-square—Imp. in apparatus to be used on railways to indicate to the engine driver of a carriage train the length of time which has intervened since the passing of a previous train.

191. N. Clayton and J. Shuttleworth, Lincoln—Imp. in rotatory screens suitable for screening wheat and other grain or seed.

193. H. Holcroft, Rue de la Grandiere, Tours, France—Improved machinery for separating substances of different specific gravities.

195. J. C. Brandes, 24, Rue Dunkerque, Paris—An improved hair creaser or divider.

Dated 22nd January, 1863.

197. J. Ellacot, Liverpool—Imp. applicable to spur wheels, racks, and other toothed gear to insure greater strength in the teeth.

199. R. Penney, Carrbrook, Cheshire—An improved solution or mixture for fixing certain colours employed in printing calico and other fabrics.

201. W. Clark, 53, Chancery-lane—An imp. in piston valves and other pistons. (A com.)

203. T. Lambert, Short-street, Lambeth—Imp. in apparatus for drawing off water or other fluids.

205. F. W. Morley, Bedford—Imp. in boilers for steam engines, and in valves to be used therewith.

Dated 23rd January, 1863.

207. A. Henderson, Dundee—Imp. in the preparation or manufacture of textile materials, and in the machinery or apparatus used therein.

209. C. Stopford, Bristol—Imp. in the construction of hats and other coverings for the head.

210. F. N. Gisborne, 3, Adelaide-place, London-bridge—Imp. in the means of communicating signals on board ship, and of indicating the position of the rudder.

211. W. Clark, 53, Chancery-lane—Imp. in mariners' compasses. (A com.)

213. C. Turner, Leeds—Imp. in the manufacture of felted fabrics.

Dated 24th January, 1863.

215. A. O. Glossop, Sheffield—Certain imp. in the construction and manufacture of breakfast cruet and liquor frames used in dinner and other services.

217. W. Allen, Cheadle, and W. Johnson, Newton Moor, Cheshire,—Certain imp. in machinery or apparatus for grinding or pointing the cards employed in carding engines.

219. E. Booth and G. Booth, Gorton, near Manchester, and A. Swallow, Staley-bridge—Certain imp. in the mode of fixing colouring matter on cotton, silk, wool, and other fibres and materials, and certain imp. in finishing such like and other textile fabrics and yarns.

221. W. Clark, 53, Chancery-lane—Imp. in syphons applied to draining, irrigation, and other purposes, whereby they self-suspend and resume action according to requirements. (A com.)

223. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of anvils, and other metal articles requiring hard surfaces. (A com.)

225. F. Tolhausen, 17, Faubourg Montmartre, Paris—Imp. in machines for carding fibrous materials. (A com.)

Dated 26th January, 1863.

226. W. F. Stanley, 3, Great Turnstile—Imp. in mathematical drawing instruments.

229. J. Fyfe, Greenock—Imp. in safety apparatus for steam boilers.

231. R. A. Brooman, 166, Fleet-street—Imp. in petticoats or crinolines. (A com.)

Dated 27th January, 1863.

232. H. H. Henson, 13, Parliament-street, Westminster—Imp. in fabrics for covering floors, walls, roofs, and other surfaces or objects, which fabrics are also partly applicable to the manufacture of waterproof articles.

233. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in preserving provisions, and in the apparatus employed for such purpose. (A com.)

PATENTS SEALED.

[*From Gazette, February 13th*, 1863.]

February 13th.

2299. J. Barclay.
2311. S. A. Bell and T. Higgins.
2315. J. T. Oakley.
2321. V. F. Cleuet.
2323. S. Boucher.
2326. J. G. Tongue.
2327. W. Whittle.
2331. J. Standish and J. Gooden.
2335. J. C. Schemmann.
2341. S. F. Griffin.
2357. M. K. Angelo.
2361. M. J. Haines.
2396. F. H. Lefranc.
2436. F. C. Bakewell.
2455. J. S. Margetson.
2467. W. A. Richards.
2513. J. Thom.
2530. W. G. Rawbone.
2655. J. Wright.
2768. D. Reid and C. J. Reid.
2945. M. C. de Casteras Sinibaldi.

[*From Gazette, February 17th*, 1863.]

February 17th.

2332. S. Wilkes.
2338. T. Clements, P. Llewellin, J. Llewellin, and J. W. James.
2344. W. Barrett.
2346. J. Mackay.
2348. H. Twelvetrees.
2352. W. Carwood, W. Boaz, and C. Colwell.
2421. W. Clark.
2446. W. Clark.
2486. M. Smith.
2502. W. Clark.
2512. J. B. Smith.
2550. J. Simpson.
2557. P. H. Whitehead.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, February 17th*, 1863.]

February 9th.

349. J. C. Lupton and J. Bleasdale.
359. D. Auld.
368. D. Dietz.
406. M. J. Haines.
430. J. H. Johnson.
438. J. H. Johnson.
480. S. S. Bateson.

February 10th.

367. H. D. Denison.
379. W. Mitton and J. Penney.

February 11th.

394. W. Clark.

February 12th.

386. J. Green.
399. W. Leatham.
481. T. Lovelidge.

February 13th.

419. J. G. Jennings.
420. E. Caplen.
423. G. Parsons.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, February 17th*, 1863.]

February 9th.

354. W. H. Harfield.
358. G. T. Bousfield.
366. S. Fox.

February 12th.

380. W. M'Farlane.

February 13th.

419. C. S. Jackson.
438. J. Barsham.

February 14th.

391. E. Oldfield.
403. H. J. Hyams.
618. P. Marcus.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 27, 1863.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th inst., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary.*

The subscription of each member is limited to one guinea.

The following is the list of subscribers up to the 26th inst. :—

Adams, Thomas	£1	1	0
Addington, Right Hon. Henry Unwin	1	1	0
Akroyd, Edward	1	1	0
Alger, John	1	1	0
Ames, John	1	1	0
Anderton, James	1	1	0
Andrew, W. P.	1	1	0
Atkinson, William	1	1	0
Austin, James	1	1	0
Bacon, Jacob Perkins	1	1	0
Balleras, Guillermo Esteban	1	1	0
Barber, Charles	1	1	0
Bartlett, William E.	1	1	0
Birkett, John	1	1	0
Blagden, George	1	1	0
Blaine, Delabere Roberton	1	1	0
Bodkin, William Henry	1	1	0
Boileau, Sir John P., Bart., F.R.S	1	1	0
Bowley, Robert K.	1	1	0
Boyd, James	1	1	0
Braby, Frederick	1	1	0
Brassey, Thomas	1	1	0
Brickwood, John Strettell	1	1	0
Brook, Charles	1	1	0
Brookes, William	1	1	0
Brooks, Henry	1	1	0
Browell, Edward M.	1	1	0
Brown, Sir William, Bart.	1	1	0
Browne, Edward	1	1	0
Budgett, John P.	1	1	0
Burgoyne, Gen. Sir John F., Bart., G.C.B., F.R.S.	1	1	0
Burton, William S.	1	1	0
Cama, M. H.	1	1	0
Caplin, Madame R. A.	1	1	0
Champion, Percival	1	1	0
Chance, Robert Lucas	1	1	0
Chater Joseph	1	1	0
Christie, Robert Monro	1	1	0
Clabon, John M.	1	1	0
Clutton, John	1	1	0
Cock, John, Junr.	£1	1	0
Coghlan, H. T.	1	1	0
Cole, Henry, C.B.	1	1	0
Corbett, John	1	1	0
Corderry, Edward	1	1	0
Courtauld, Samuel	1	1	0
Creed, Henry	1	1	0
Critchett, Charles (Assistant Secretary)	1	1	0
Curling, Joseph	1	1	0
Crawford, Robert Wygram, M.P.	1	1	0
Darby, Abraham	1	1	0
Davenport, Samuel Thomas (Financial Officer)	1	1	0
Dawbarn, Richard W.	1	1	0
Dawbarn, Robert	1	1	0
Day, William	1	1	0
Dilke, Sir C. Wentworth, Bart.	1	1	0
Dilke, Charles W.	1	1	0
Docker, F. W.	1	1	0
Dowleans, A. M.	1	1	0
Drax, J. S. W. S. Erle, M.P.	1	1	0
Dutton, William C.	1	1	0
Eamonson, Joshua J.	1	1	0
Eastham, John	1	1	0
Easton, James	1	1	0
Easton, Percy Shaud	1	1	0
Ebury, Lord	1	1	0
Elliot, William Henry Fletcher	1	0	0
Ellis, William	1	1	0
Evans, E. Bickerton	1	1	0
Evans, Jeremiah	1	1	0
Ewart, William M.P.	1	1	0
Faraday, Michael, D.C.L., F.R.S.	1	1	0
Faulkner, John, Junr.	1	1	0
Field, John	1	1	0
Field, William	1	1	0
Fordham, Thomas	1	1	0
Foster, P. Le Neve (Secretary)	1	1	0
Fox, Sir Charles	1	1	0
Fowler, Robert N.	1	1	0
Freer, Rev. Richard Lane, D.D.	1	1	0
Garling, Henry	1	1	0
Geeves, William	1	1	0
Gilbart, James William, F.R.S.	1	1	0
Goding, Charles	1	1	0
Godwin, George, F.R.S.	1	1	0
Gooch, Joseph H.	1	1	0
Goode, Thomas	1	1	0
Gordon, Col. W. J., C.B., R.E., D.A.G.	1	1	0
Graham, Peter	1	1	0
Graham, Thomas, D.C.L., F.R.S.	1	1	0
Graham, William	1	1	0
Grant, Alexander	1	1	0
Grey, Major-General the Hon. Charles	1	1	0
Hack, Thomas	0	10	6
Haden, F. Seymour, F.R.C.S.	1	1	0
Hall, Walter	1	1	0
Hamilton, Edward	1	1	0
Hancock, James Lyne	1	1	0
Hancock, Frederick William	1	1	0
Hanhart, Michael	1	1	0
Hannay, John	0	10	6
Hannay, Robert	1	1	0
Hannay, Thomas	0	10	6
Hawes, William	1	1	0
Headland, Edward	1	1	0
Heane, Henry	1	1	0
Heymann, Lewis	1	1	0
Heywood, James	1	1	0
Hicks, Thomas	1	1	0
Hollins, Michael Daintree	1	1	0
Holmes, Alfred William	1	1	0

Holmes, Herbert Mountford	£1	1	0
Holmes, James	1	1	0
Horton, Isaac	1	1	0
James, Jabez	1	1	0
Joel, Joseph	1	1	0
Johnson, Henry	1	1	0
Johnson, Jabez	1	1	0
Jones, Owen	1	1	0
Jones, Richard Lambert	1	1	0
Kelk, John	1	1	0
Kemp, George T.	1	1	0
Lawrence, Frederick	1	1	0
Larnach, Donald	1	1	0
Leeks, Edward Frederick	1	1	0
Levi, Leone	1	1	0
Lucas, Thomas	1	1	0
Macarthur, Major-Gen. Edward, C.B.	1	1	0
MacDonald, J. C.	1	1	0
Macfarlane, Walter	1	1	0
Maclea, Charles G.	1	1	0
Malcolm, Major-Gen. G. A.	1	1	0
Manby, Charles, F.R.S.	1	1	0
Marsh, Matthew Henry, M.P.	1	1	0
Martin, Thomas	1	1	0
Martineau, David	1	1	0
May, Harry	1	1	0
McMurray, William	1	1	0
Mechi, Alderman	1	1	0
Merle, William Henry	1	1	0
Miles, Alfred W.	1	1	0
Mocatta, Benjamin	1	1	0
Moore, Charles	0	10	6
Morant, Robert	1	1	0
Moulton, Stephen	1	1	0
Muir, William	0	10	6
Mulready, William, R.A.	1	1	0
Munn, Major W. A.	1	1	0
Murchison, J. H.	1	1	0
Murchison, Sir Roderick Impey, D.C.L.	1	1	0
Napier, Robert	1	1	0
Navroji, Dádábhái	1	1	0
Newcombe, S. Prout	1	1	0
Oldershaw, Capt.	1	1	0
Pakington, Sir John S., Bart., M.P.	1	1	0
Palmer, George	1	1	0
Pearce, Alfred B.	1	1	0
Petrie, Samuel	1	1	0
Phillips, Sir Thomas, F.G.S.	1	1	0
Potter, Thomas	1	1	0
Preller, C. A.	1	1	0
Price, Arthur J.	1	1	0
Proctor, John	1	1	0
Provis, William Alexander	1	1	0
Radstock, Lord	1	1	0
Ratcliff, Charles	1	1	0
Rawson, W. H. Jun.	1	1	0
Redgrave, Samuel	1	1	0
Reeve, Charles	1	1	0
Reveley, Henry W	0	10	6
Reiss, James	1	1	0
Rixon, Alfred H.	1	1	0
Robb, Alexander	1	1	0
Russell, Capt. G.	0	10	0
Russell, John James	1	1	0
Russell, John Scott, F.R.S.	1	1	0
St. David's, Bishop of	1	1	0
Salomons, Aaron	1	1	0
Salomons, David	£1	1	0
Sargood, F. J.	1	1	0
Saul, G. T.	1	1	0
Schneider, Richard	1	1	0
Sedgwick, John Bell	1	1	0
Shearer, Betteswoth Pitt	1	1	0
Shove, W. Spencer	1	1	0
Simon, George	1	1	0
Smart, Sir George T.	1	1	0
Smith, George	1	1	0
Smith, J. Scott	1	1	0
Smith, R. M.	1	1	0
Smith, T. Mosdell	1	1	0
Sopwith, Thomas, F.R.S.	1	1	0
Stanton, George	1	1	0
Stephens, Charles	1	1	0
Stirling, Thomas	1	1	0
Straker, John	1	1	0
Symonds, Capt. R.N.	1	1	0
Sykes, Col. W. H., M.P., F.R.S.	1	1	0
Taylor, George	1	1	0
Taylor, John	1	1	0
Trevelyan, Arthur	1	1	0
Trevelyan, Sir Walter Calverley, Bart.	1	1	0
Tulloch, James	1	1	0
Twining, Thomas	1	1	0
Underdown, E. M.	1	1	0
Veitch, James	1	1	0
Vieweg, A. J.	1	1	0
Walker, Sir Edward S.	1	1	0
Webb, Charles Locock	1	1	0
Williams, Charles Wye	1	1	0
Williams, Walter	1	1	0
Williams, William	1	1	0
Wilson, G. Fergusson, F.R.S.	1	1	0
Wilson, W. Newton	1	1	0
Winkworth, Thomas	1	1	0
Woodd, Basil Thomas, M.P.	1	1	0
Wood, John	1	1	0
Woollams, Henry	1	1	0
Wright, Philip	1	1	0
Wyon, Leonard C.	1	1	0
Yeats, John, LL.D., F.R.G.S.	1	1	0

WOOD CARVING.

EXHIBITION AND OFFER OF PREMIUMS.

The Council have had under consideration a communication from the Society of Wood Carvers, asking the aid of the Society of Arts in promoting the art of wood carving in this country, and they have agreed to allow the use of the Society's rooms for the purpose of holding an exhibition of wood carving, both modern and ancient, in the month of June next. The Council have further agreed to offer the Society's Silver Medal and to make a grant of £30, the Society of Wood Carvers giving £15, as a fund for prizes to be awarded to the most meritorious exhibitors on that occasion, in the following divisions, thus:—

First Division.

Human figure in alto or bas relief. Animals or natural foliage may be used as accessories.

1st Prize of £8 and the Society's Silver Medal.
2nd Prize of £4.
3rd Prize of £3.

SECOND DIVISION.

Animal or still life. Fruit, flowers, or natural foliage may be used as accessories.

1st Prize of £8.
2nd Prize of £4.
3rd Prize of £3.

THIRD DIVISION.

Natural foliage, fruit, or flowers, or conventional ornament in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.

1st Prize of £8.
2nd Prize of £4.
3rd Prize of £3.

Employers or private owners may be Exhibitors, but *bonâ fide* workmen only can receive Prizes.

The Judges will be selected as follows:—Four by the Council of the Society of Arts, and three by the Society of Wood Carvers.

TWELFTH ORDINARY MEETING.

WEDNESDAY, FEBRUARY 25, 1863.

The Twelfth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 25th inst., Thomas Bazley, Esq., M.P., Vice-President of the Society, in the chair.

The following candidates were proposed for election as members of the Society:—

Atkinson, Mrs. William.	47, Gordon-square, W.C.
Dundas, George Hamilton.	13, Pall-mall, S.W.
Fowke, Thomas............	11, Mornington-place, Hampstead-road, N.W.
Purdie, James...............	3, Walbrook-buildings, E.C.
Scott, Alexander Nairn...	5, Bury-st., St. James's, S.W.

The following Candidates were balloted for and duly elected members of the Society:—

Bright, Sir Charles	1, Victoria-street, Westminster, S.W.
Clark, Latimer	1, Victoria-street, Westminster, S.W.
Corss, James	63, Shoreditch High-street, N.E.
Deane, Edward	1, Arthur-street East, London-bridge, E.C.
Figg, John Wilmin	1, Denmark-street, Soho, W.C.
Pierce, Charles	Boandices, Balham.
Pim, Captain Bedford, R.N.	Junior United Service Club, S.W.
Seager, General Edward...	9, St. James's-street, S.W.
Shallis, John	11, St. Mark's-square, N.W.

AND AS HONORARY CORRESPONDING MEMBER.

Maurice, G.	Secretary of the Société d'Encouragement, 44, Rue Bonaparte, Paris.

The following Institution has been received into Union since the last announcement:—

St. Peter's Reading-room.

The Paper read was—

ON THE PRESENT POSITION AND FUTURE PROSPECTS OF THE SUPPLY OF COTTON.

BY JOHN CHEETHAM.

In the year 1858, my friend Mr. Ashworth read an able paper before the members of this Society, minutely tracing the rise and progress of the cotton manufacture, and describing the numerous changes, social and commercial, which it had effected in Lancashire and the adjoining counties. Referring to the supply of the raw material, he made the following observation:—"The entire failure of a cotton crop, should it ever occur, would utterly destroy, and perhaps for ever, all the manufacturing prosperity we possess. Or, should the growth in any one year be only one million, instead of three millions, of bales, the manufacturing and trading classes would find themselves involved in losses which, in many cases, would amount to irretrievable ruin—millions of our countrymen would become deprived of employment and food, and, as a consequence, the misfortune would involve this country in a series of calamities, political, social, and commercial, such as cannot be contemplated without anxiety and dismay." Little did my friend think that what he then shrunk from contemplating would, within the short period of four years, actually occur. It is true no entire failure of the crop has ensued, but the supply which, in 1860, was 3,360,000 bales imported into Great Britain, was, in 1862, only 1,400,000, and the consequent diminution in employment is represented by a reduction in the rate of consumption from 48,500 bales per week in the former year, to 22,800 in the latter, entailing a weekly loss in wages of £170,000, and leaving not less than half a million of operatives to be sustained by charitable relief, or from parochial funds. The patience and loyalty with which this class have borne their sufferings have excited the admiration of their countrymen at large, and will, I hope, tend to make more universally known the valuable qualities of a population which, at a distance, has not been regarded with that appreciation to which it is justly entitled. Even if we could believe that these evils were already past, or rapidly disappearing, they would furnish valid ground for thoroughly re-considering the question of cotton supply, with a view to prevent their recurrence. But the contrary is the case. As time progresses, the area of distress extends. The various trades connected with the cotton manufacture are now suffering. Fixed investments of capital, estimated to be sixty millions sterling, are no longer profitable. Mills and manufactures are worked at a loss, and when closed are deteriorating in value. In short, a continuance of the present state of things will slowly, but surely, entail ruin upon all concerned. Only one remedy can arrest this. We very gratefully and heartily acknowledge the unexampled liberality with which voluntary aid has been extended to the sufferers, but the very benevolence which prompted it would condemn a continued dependence on such help as undesirable even if it were practicable. Modifications of the Poor Law—grants of public money—can only be temporary expedients. Emigration, if adopted by a few only, would not relieve the great mass of the unemployed, and, if removing large numbers, would effectually postpone any great improvement in the state of trade, by still further increasing the scarcity of labour, which has always been one of its great hindrances. Only one remedy must be sought. The want of raw material has occasioned these evils. The supply of cotton must remove them. How is that supply to be obtained? In order to answer this question, it will be necessary for us to consider the cause of the present deficiency. It has arisen really from too great a reliance upon one source of supply, a dependence, the danger of which, though frequently pointed out, has excited comparatively little notice or alarm. How great was this dependence may be seen from the fact that in the year 1860, whilst the total consumption was 48,500 bales per week, 41,000, or 85 per cent., were American; 4,000, or 8 per cent., from Egypt and Brazil; and 3,500, or 7 per

cent. from East and West Indies: thus leaving $\frac{4}{5}$ths of the supply to America, and only $\frac{1}{6}$th to all other cotton-producing countries.

The inquiry at once arises, What has occasioned this great preponderance in favour of the American planter? I purpose, first of all, to endeavour to answer that question, and then to notice successively the other cotton producing countries, comparing their facilities and disadvantages for the growth of this crop, with those of the great field of cotton cultivation.

The planter of the Southern States is an Anglo-Saxon, possessing the skill, enterprise, and energy peculiar to that race. He is situated in a favourable climate, has a rich and fertile soil, an abundance of land, not heavily taxed, and a supply of labour well organised, and under perfect control, whatever may be said as to its morality or real economy. As an intelligent and skilful husbandman, he pays the strictest attention to the sowing of the seed, treatment of the land, and the different stages in the cultivation of the crop, which this plant seems specially to require. His implements of husbandry are of the most improved construction. He is specially careful in the picking, gathering, and cleaning of his cotton, using machines for the last object of the most approved and economical description. His country is intersected by roads, railways, and rivers, which give cheap and expeditious access to the ports of shipment. He can avail himself, when requisite, of an advance of capital at a reasonable rate from his factor, to whom his cotton is consigned, and he has felt himself under a government which secured protection to life and property, and did not oppose obstacles to the success of the work in which he is engaged. By this favourable combination of circumstances, the Southern planter has been able to produce the most useful qualities of cotton known, from the fine Sea Island to the low ordinary Orleans, at a cost which has distanced all competitors, and enabled him to extend his annual production from 430,000 bales in 1820 to 4,675,000 bales in 1860, this latter representing in value the sum of forty millions sterling.

Such, then, is the extent of that exportation from the Southern states, which has been suddenly but effectually stopped by the civil war now raging upon the American Continent. Only 71,000 bales have, during the year 1862, reached us from this source, nor can we, should the war continue, expect a much larger annual supply. Indeed, we ought not to conceal from ourselves the unwelcome truth, that in this contingency, even with all the extraordinary impetus given to cotton cultivation by the high price offered, there cannot for years be any adequate supply of the required material. It has taken the Southern planter twenty years to double his crop, even with all the exceptional facilities at his command. A far larger increase, with far fewer advantages, would in this case be required from the other cotton-growing countries. If, however, peace should soon be restored, we may indeed expect a temporary relief, by the arrival of the accumulated crops of the last two years, amounting perhaps to four millions of bales. But so much land has been thrown out of cultivation, or sown with other crops, labour and capital will have become so disorganised by the war, be the terms of peace what they may, that he production of the American fields will for some time be limited. What effect this continued deficiency, and consequent high price of the raw material, will have upon the cotton manufacture, it is not difficult to foresee. On the one hand, experience teaches us that they will seriously limit the demand for the manufactured article, and so restrict the trade; but, on the other, they will so stimulate the cultivation of cotton wherever that crop can be grown, that before long we may expect that imports from other countries will fully supplement the American supply. But although we have to expect a diminished exportation from the Southern States, it will still be comparatively large. Possessing many of his former advantages, compelled to find employment for the population around him, whether slave or free, the Southern planter can adopt no more profitable employment than the cultivation of cotton, and accordingly we shall, under any circumstances, again derive a considerable proportion of our supply from the Southern States. There is, however, one serious drawback to the advantages he possesses. His labour is slave labour, the cause of the present unfortunate strife, and, so long as this is relied upon, it becomes an element of uncertainty and danger. My hope, however, is, that the prospect of its abolition is now nearer than before, and that when the South has achieved its independence, events will compel it to take measures to place itself in harmony, upon this question, with the general opinion of the civilised world.

Egypt.

The country which, next to America and India, furnishes us with the largest supply is Egypt. The cultivation of the species of the cotton plant now known there dates only from the year 1821, when it was brought under the notice of Mahomed Ali, by M. Jumel, a French mechanician. Its first export to this country was in 1823, when over 5,000 bales were imported. Last year 150,000 bales were received, an increase of 50 per cent. upon the previous year, and the present crop is estimated to be 200,000 bales, which, at present value, will amount to six millions sterling. Egypt is calculated to possess 7,000,000 acres of land capable of being cultivated, of which 4,000,000 are in a state of cultivation, but of these only 350,000 are occupied by cotton. Irrigation is essential, and it would appear that the network of canals to effect this was much more extensive in former ages than at the present day. The extension of these works and their preservation is the especial duty of the government, and the increase of production and improvement in quality, are dependent upon the facilities possessed for irrigation by the cultivators. The rude implements of husbandry, little superior to those in use in the days of the Pharaohs, are a hindrance to more successful cultivation, as also the want of improved machinery for separating the cotton from the seed. This latter, however, is gradually being removed, as several hundred gins are now at work in the hands of capitalists, turned by steam power, and clearing the cotton as economically as it is effected in the Southern States of America. A system of classification has also been introduced on some of the large estates, which has enhanced the value of the crop 2d. per lb. The tenure of the land is satisfactory to the fellah, and is not heavily taxed. Mr. Fowler, of Alexandria, a resident for several years in Egypt, in a very able report upon the cultivation of cotton in that country, says—"Where land is properly cultivated, and the cotton plants sufficiently watered by artificial irrigation during the growth, 500 lbs. of clean cotton per acre may be produced," and he adds, "There is in fact no question that the lands at present cultivated in Lower Egypt might be made to yield fully double, and probably treble, the actual amount of produce by an improved system of husbandry;" and he concludes by observing, "When it is considered there are at the present day nearly three millions of acres of fertile land fitted for cultivation in Lower Egypt, with a soil and climate admirably adapted for producing cotton, with the facility and cheapness of annual fertilization by the inundation of the Nile, with cheap and facile means of transport by this river and its canals, and the additional facility of railways to the port of Alexandria for export, it is not too much to say that Egypt in a few years, supposing only one-third of the cultivated land sown with cotton, might advantageously produce and export annually one million of bales."

We have further the valuable testimony of Mr. Byrne, who has long resided in Egypt, and had much practical experience in cotton cultivation. He says:—"There are 3,000,000 acres of fertile land in Lower Egypt, of which 350,000 only are sown with cotton. There is no reason why this crop should not be at least doubled on the lands already working, leaving out altogether the unclaimed and

desert parts of the country. There is not the slightest doubt that, were the natives taught by force of example to bestow more care on the levelling and working of their ground, and to avail themselves of more efficient agricultural implements, the present average yield per acre might be greatly increased." He further observes:— "During the past season, the experiment of sowing New Orleans seed has been tried on a small scale on the estates of the late El Hami Pasha, and having the result under my own observation, I am of opinion that the extension of this seed would be of great advantage. The plants are even hardier than the native long-stapled cotton, and the cotton is a kind evidently well suited to this climate, and though the shortness of the staple places its value below that of our own cotton, yet, when artificially watered before the flow of the Nile, the yield has averaged one third more than of fine Egyptian. The colour is very white, and samples sent to England having been classed as equal in every way to good Orleans, it is evident the increased yield will more than compensate for the loss in price."

In Egypt, as in most eastern countries, the material prosperity and social condition of its people depend chiefly upon its ruler. In the absence of a middle class of society private enterprise flags, and all improvements tending to the development of agriculture, or the introduction of the appliances of European civilisation, must be brought about chiefly by the governor. The late viceroy, Said Pasha, was not negligent of this responsibility cast upon him. Upon his visit to Manchester last year, he expressed his warmest desire to extend the cultivation of cotton in his country, and his readiness to consider any suggestions made to him to contribute to that object. It was submitted that the maintenance of canals for irrigation, and their increase, was an essential requisite, and that the introduction of American seed into Upper Egypt, where as yet cotton is not cultivated at all, would be desirable, as introducing another variety more extensively in demand, and as enlarging the area of present cultivation. He observed, in reply, that, in regard to the first suggestion, he was engaged already in its performance, and as to the second, he would direct it to be carried out. He intimated that the chief difficulties in the way of increase lay in defective husbandry and an exorbitant rate of interest paid by the fellahs upon money advances made to them; and he suggested that two or three skilful agriculturists should be sent over to give instruction to the cultivators, and that a bank or company be formed for the purpose of making advances to them at a more reasonable rate of interest. This latter idea has been taken up by Ishmail Pasha, his successor, who has intimated his intention to make the requisite advances himself to the cultivators. The new viceroy has the advantage of practical acquaintance with cotton cultivation, having the largest estates in the country, and producing the most approved quality. Much is expected from his vigour and intelligence, and with the finances of Egypt in a favourable position, he will be able to carry out those improvements which may be requisite for developing its agricultural resources.

It will be seen, from what I have already stated, that Egypt possesses many of the requisite advantages for cultivating cotton extensively. She has a settled Government, fully aware that the increased exportation of cotton will materially advance the interests of the country, a rich soil, facilities of irrigation, railway and water transit, easy access to the sea-board, and steam and telegraphic communication with the markets of Europe. The extent of her territory, as compared with America or India, is very inconsiderable, but I have no doubt of her capability, as already stated, of producing one million bales per annum.

In a communication lately received from a friend, who has returned to Egypt after two years' absence, he speaks of the immense strides made in wealth by that country within that period, and expresses his surprise at the great increase of European population.

Let us now turn to a country, like the preceding one, forming part of the Ottoman Empire.

ASIA MINOR AND TURKEY IN EUROPE.

There are merchants now resident in Smyrna who remember an export of 50,000 bales per annum from that port, but for several years past the cultivation of cotton has diminished and the exports been very trivial. In 1860, only 6,000 bales were exported; in 1862, 10,000 bales; but for the present year, the export is estimated at 50,000 to 60,000 bales. In a recent despatch to Lord Russell, the British Consul says, "It is the general expectation that the rend of 1863 will be at least 200,000 bales, or 72 million of pounds." This rapid increase of production is owing mainly to the unassisted efforts of the native cultivators. What, then, may be the results when foreign capital and skill are brought to bear upon a country whose climate, soil, and general capabilities, are highly favourable to the production of a good quality of cotton. It is not taking too sanguine a view to expect, in a few years hence, that 500,000 bales will be the annual production of the Turkish dominions in Europe and Asia.

The attention of English manufacturers has recently been specially directed to Asia Minor, from the results which have followed the introduction of New Orleans seed for cultivation. The native cotton, though clean and bright in colour, is short in staple and loose in fibre, but that grown from New Orleans seed is fully equal, in every respect, to the best growth of this cotton in America. Hence it is probable, if the cultivation of this seed be substituted for that of the indigenous, we may obtain from Asia Minor a supply of those special qualities of American cotton which are in such high repute with the majority of consumers, and which as yet no other country has produced. The British Vice-Consul, Mr. Maling, in a report (March, 1859) upon the experimental cultivation of New Orleans cotton in the district of Cavalla, in Turkey in Europe, the seed for which had been forwarded to him by the Cotton Supply Association, states, that the growth of the New Orleans plant has been much more luxuriant than that of the indigenous product; the latter in many instances rises above a foot and a half from the soil, while the former has averaged two and a half to three feet, and in some instances four to five feet in height. The native plant gives from 10 to 30 bolls, the New Orleans more luxuriant growth yields from 50 to 80 bolls. The average yield per acre of cotton bolls is 2,525lbs. of cotton; after ginning, 565lbs. When in bloom, the flowers are not liable to be knocked off the foreign plant by rain, as happens to the native cotton. The culture of the New Orleans plant has not proved more laborious nor entailed more expenditure than the native; indeed, a slight saving is effected by the former being more easily picked. This foreign plant has proved earlier in reaching maturity by a month in some instances, and generally by from ten to fifteen days. Native cotton is worth about 6d. per lb. It is not possible to say the relative value of New Orleans growth, so little having been produced that a fair mercantile value cannot be placed upon it. It is undoubtedly far superior in colour, fineness, and strength and length of fibre to the country produce, and this is so apparent, even to the unsophisticated native, that one farmer actually demands for the small sample he has raised a price equivalent to 10d. per lb. Mr. Maling shows, by a statement of the cost of production, that at a value of 6d. per lb., £5 10s. per acre might be realised as profit to the cultivator, but notwithstanding this proof, the superiority of the New Orleans growth, its more abundant yield by 20 or 30 per cent., and its culture not entailing a greater amount of labour or expenditure than is essential to the indigenous plant, yet a strong objection existed to its cultivation, arising from the collection of the tithe, which until recently prevailed in the Ottoman dominions. The farmer is not allowed to pick and house his cotton when ripe; he must wait the coming of the tithe collector, until he has inspected and formed his estimate of the standing crop. The native cotton will bear standing in the fields, but if the New Orleans

cotton be not picked immediately when at maturity, the boll opens and the contents fall to the ground and are lost, or in great part wasted and discoloured. This subject was brought under the notice of the Turkish Government through his Excellency Musurus Bey, the ambassador, who has taken an active personal interest in promoting the cultivation of cotton in his official character, as well as on his own estates; the result has been the recent issue of an ordinance originating many important measures for the encouragement of cotton cultivation in the Ottoman empire. The tithe of produce is abolished, and in lieu a fixed tax is imposed; uncultivated lands are converted into cotton plantations, and exempted from all taxes for five years; improvement of the roads is to be undertaken; all implements and machines required for cotton cultivation are to be exempt from import duties; no additional export duty is to be paid upon superior qualities of cotton, and foreign seed is to be distributed gratuitously by the government, with practical instructions necessary for its cultivation. These constitute a series of valuable reforms, which, if energetically carried out, must materially tend to a considerable extension of cotton cultivation in the Ottoman Empire. It were well that our Indian authorities would descend from their lofty assumption of superior knowledge of cotton cultivation, and take a lesson of practical wisdom from this sample of enlightened sagacity and statesmanship on the part of the Turk.

I may be told that the anarchial state of Asia Minor has hitherto been considered a bar to any extensive cultivation of the soil. But what is the cause of this anarchy? Does it not chiefly arise from the non-employment of the population engendering habits of wild and lawless living? And what more likely to correct this than the introduction of new and extensive means of employment, by which a considerable sum of money will circulate amongst all classes, creating a demand for the wants and comforts of civilised life, and inculcating deference to order and good government. Am I too sanguine in supposing it probable that the cultivation of cotton will produce great and important social changes both in Egypt and Asia Minor, and that the long dreary decay of intellectual and physical energy in these Eastern biblical and classical lands will be superseded by the intelligence and vigour infused into their populations from the demands of Western industry and commerce.

I may add, as yet further evincing the interest taken by the Turkish government in this subject, that a special Commission, composed both of natives and foreigners, has been instituted to collect information as to cotton cultivation, and also that such is the confidence of capitalists at home in the success of these efforts, that a well-supported company has recently been formed in Manchester to promote the cultivation of cotton in Asia Minor.

BRAZIL.

Brazil is the country which comes next in supply after Egypt. Fifty years ago it forwarded 150,000 bales annually to this market, but for several years its production has declined; the cultivation of sugar and coffee, for which its soil and climate are admirably adapted, having superseded cotton. The quality produced is good, more valuable than New Orleans cotton, and ranging in classification with Egyptian. There is abundance of land, but labour is deficient, and greater energy and enterprise are required than the Portuguese possess. It is understood, however, that the present crisis in America has roused the interest of producers, that more land has been placed under cultivation, and a considerable increase upon last year's production is anticipated. 130,000 bales arrived in 1862, and the estimate for the present year is 250,000.

Peru has for several years produced a limited supply, of very excellent quality. It possesses a large extent of land close to the seaboard, has a favourable climate, and its soil will yield two crops in the year. The obstacle to production has been scarcity of labour, which the government is endeavouring to remove, by permitting the introduction of Chinese and Polynesian labourers, who are found to work satisfactorily. Though other pursuits have hitherto engaged the attention of its inhabitants, recent information leads to the expectation of a considerable increase in the production of cotton in Peru.

Our West Indian Colonies, which at the commencement of the present century furnished us with a large supply of cotton, now contribute a very insignificant one, the average annual production for many years past not exceeding 10,000 bales. The colonists, unable to contend with the low price at which the American planter could produce, have turned their attention to the cultivation of sugar and coffee, for the production of which the climate and soil are peculiarly adapted, and of which they export considerable quantities. It is not probable that the capital and labour thus employed will be diverted again to the production of cotton, though at the present exceptional high prices there might be a temptation to do this. Land not otherwise occupied may be turned to this production, but it will be only upon a small scale, the results of which will add little to our imports, nor materially alter the insignificant position which our West Indian Colonies hold as cotton-producing countries.

AFRICA.

We must now turn our attention to other parts of Africa, from whence it is said we are to receive large supplies from new fields of discovery. The French colony of Algiers has for several years been engaged in the cultivation of cotton. In 1844 attempts were first made; but in 1852, eight years after, the production was only 40 bales of 240lbs. each. In 1853 the government offered large premiums as a bounty upon cultivation; and in 1861, 1,596 bales were exported. This is not a promising result after eighteen years' experiment. The climate is favourable, and the quality of the cotton, chiefly grown from Sea Island seed, is good, but the expense of irrigating the land, which is absolutely requisite, and the scarcity and high price of labour, ranging from 2 to 3 francs per day, are difficulties to be contended with, rendering it improbable that Algeria will become a large contributor to our supplies.

But it is to the West Coast of Africa that our attention has been specially directed. There is no question that cotton of good quality, equal to middling Orleans, is grown there, and, from the accounts of travellers, over a large tract of country. The natives manufacture from it a peculiar style of cloth for their own consumption, and for export to their countrymen in the Brazils. For some years past my friend Mr. Clegg, of Manchester, has laboured with commendable philanthropy to open up a trade in the export of cotton from this country. In 1855, five bales, of 400lbs. each, were exported; in 1860, this had increased to 580 bales, and in 1862, to 950 bales. The Cotton Supply Association has also rendered aid in the promotion of this object, but a pestilential climate, want of roads and communications, and, above all, the existence of the slave trade, and of a barbarous government, which renders life and property insecure, are formidable difficulties, and will postpone to a distant period the realization of that success with which all must hope these efforts may finally be crowned. The late governor of Sierra Leone confirms my views, and states, that whilst glad to hear of the benevolent attempts making to originate a trade in cotton amongst the negro tribes of the West Coast, he is of opinion a generation must pass away before any extensive results will appear.

But, I shall be reminded, that a large trade has arisen in palm oil, which 30 years ago had no existence, and why not a similar result occur with cotton? The production of palm oil is a rude and simple husbandry, requiring no skill in manipulation, nor any special supervision. Carried on along the seaboard, it has no difficulty in want of roads and communications to contend with, nor is it subject to expensive transit. I come to the conclusion, then, from the information before me, that no present important ad-

dition to our cotton supplies can be expected from the West Coast of Africa. We are laying the foundation of a trade in present effort, but a generation to come will reap the result.

These objections to the supply of cotton from the West Coast apply with equal force to the East Coast of Africa, which has the additional disadvantage of a more distant and expensive transit to contend with. Dr. Livingstone's discoveries will, for many years to come, add little to our cotton supplies, even though all must hope they will lead to the introduction of Christianity and its civilising influences amongst the barbarous tribes of the countries he has brought under our observation.

Natal.

The colony of Natal has attracted attention as a cotton growing country, and a company, under excellent auspices, has been formed to test its capabilities. About twelve millions of acres are available for agricultural purposes, but only a portion of this, principally along the sea-board, is suitable for cotton. It possesses a favourable climate, and has advantages in soil and facilities for shipment. It is asserted that the cost of production does not exceed 4½d. to 5d. per lb., but the want of reliable organised labour is a serious difficulty to contend with. The native Zulu is not fond of steady application. At the season when his services are most in requisition, he takes it into his head to return to his native kraal, and the crop is left to be gathered as it may. This has frustrated individual efforts hitherto made, and indisposed the colonists to further cultivation, notwithstanding seeds and machinery have from time to time been forwarded to promote it. I understand, however, the Company propose to rely upon being able to cultivate with native labour, but if not successful, they will import Coolies, who, to some extent, are now employed in the cultivation of sugar in the colony.

The government is making praiseworthy efforts to induce the natives to cultivate cotton by the distribution of seed and by taking the produce at a fixed price in return. No report as yet has been made of the result of these efforts, but the opinion of the colonists is, I believe, unfavourable to their success.

Queensland.

The young colony of Queensland is making active efforts to become a cotton-growing country. There is abundance of land upon the sea-board extending 1,000 miles, with an average breadth of 60 miles. The soil and climate are very favourable, and the government of the colony takes an active and enlightened interest in promoting this object. New Orleans cotton has been produced at the rate of 600 or 700 pounds per acre, a larger quantity than the rich lands of Louisiana or Texas can boast of, whilst the quality is fully equal to either. Some Sea Island growth forwarded to the International Exhibition sold for 5s. per pound. Of this quality 400 pounds per acre could be grown, and as one man can cultivate four or five acres, the result of his labour, taken at the low estimate of 1s. per pound, would amount to £100. But from a country where European labour is paid at from 10s. to 15s. per day, it is vain to expect a large export of cotton, if dependent upon this class of labourers. If Queensland is to compete effectively with the Southern States of America, it is indispensable she should obtain Asiatic labourers. Hitherto objections have been taken by the colonists to this step being adopted, but recently, I believe, the legislature has passed an ordinance permitting their admission.

I think it only due to my hon. friend in the chair to add, that he has been unremitting in his efforts to bring before the Government and colonists of Queensland the importance of cotton cultivation to the colony. The Cotton Supply Association has also forwarded a considerable quantity of seed for distribution amongst the emigrants from this country, and we may confidently indulge the hope that, with an abundant supply of labour, the 200 bales estimated as the probable export from thence this year, are but the commencement of the large contribution she will ultimately make to the supplies of the world.

Italy.

Previously to the recent International Exhibition, few people believed cotton could be cultivated in Italy, yet it forwarded 56 samples of various growths to the Exhibibition, of which more than half, or 29, were valued as equal to or higher than the New Orleans quality. Its culture, too, is of ancient date, for, in the tenth century, it formed, in the southern provinces of the main land and in Sicily, one of the chief products of agriculture. Even at the commencement of this century it supplied the chief markets of Europe, but for many years past its culture has diminished, and the present annual production is not estimated at more than 5,000 to 10,000 bales.

The Italian Government is desirous to take vigorous measures to renew its cultivation, and by its direction Count Devincenzi, the Italian Commissioner at the Exhibition, has issued a very able and accurate report upon the subject, in which he shows that 3,000,000 of acres are available; that labour is abundant and cheap, not exceeding a franc per day for a man, and half that sum for a woman or a boy; that there is an extensive coast line, and railways made, or under construction, to the districts to be appropriated, and he estimates the cost of production at from 4d. to 6d. per lb. With all these advantages, and in close proximity to the European markets, Italy may in a few years be an important source of supply.

China, for the first time, has exported cotton to Great Britain, having during the last year forwarded 4,400 bales. The quality is similar to that from Bengal, but clearer and brighter in colour. Cotton was probably imported into China from India, and has for many centuries been extensively cultivated for domestic consumption. The claims of its dense population, and the absence of large tracts of waste land to extend upon, must prevent China from becoming a cotton exporting country. Sir John Bowring, however, is of opinion that it is capable of affording to us a large supply, and that our attention should be directed more to that country than to India. I have not been able to meet with information which would substantiate this opinion, and I should have more confidence in its correctness, were the Chinese to cease competing with us in the markets of India, from whence, in 1860, they drew 200,000 bales. Considerable quantities are grown in the neighbourhood of Shanghai, and as the usual value there is from 3½d. to 6d. per lb., and its present price here from 1s. to 1s. 2d., we may expect some further supplies from that port to find their way to this country during the present year.

From Siam, Persia, and Japan, small quantities of cotton have arrived during the course of last year. The quality resembles that of Indian cotton—short and inferior in staple, but well cleaned, and in better condition. I refer to these supplies only as a subject of interest in connection with the source from whence they come, and not as indicating the capability of these countries to afford reliable supplies for our wants.

India.

I now come last to India, the country which, next to America, is the most important source of our supply. India has for centuries past been a cotton-producing country; and if we are to credit the statements made as to the extent of its annual production—from four to six millions of bales—it must be admitted to be the largest cotton producing country in the world. It is unquestioned that the area of land capable of growing cotton is greater than that of America, and that its abundant free labour is much cheaper than the slave labour of the Southern States, probably to the extent of 80 per cent. Of this large production, however, only 560,000 bales were received by this country in 1860, whilst America forwarded 2,580,000, and the comparison in which these qualities entered into consumption in that year, was, as I have pre-

viously stated, American, 42,000 bales per week, or 85 per cent., and Indian, 3,350, or 7 per cent. The inquiry naturally arises, if India be the largest cotton-producing country in the world, if she possess a larger area of land, and a more abundant supply of free labour than America, how is it she has not been able to compete more successfully with her rival, and why does the consumption of her produce hold so inferior a position in the markets of the world? Various replies have been made to this question. Indian authorities tell us the consumer is prejudiced; he is ignorant of his true interests; he has so long been habituated to the use of American cotton he will not investigate the merits of any other. Others darkly hint that he has a special affection for the produce of slave labour. But what is the fact? We must presume the consumer understands his own business. He resorts to Liverpool, the great cotton mart of the world, for the supply of his raw material. He has there placed before him samples of every variety of cotton produced in every part of the world, and he finds none so inferior, and of so low classification, as that which is the product of India. It is short and weak in fibre, defective in colour, imperfectly cleaned, mixed with sand and dirt, and frequently adulterated with an admixture of a still more inferior quality. If, tempted by the lower price at which it is offered, he purchases it for consumption, he sustains a loss of 25 to 30 per cent. waste as compared with 12½ to 15 in American, the production of his manufactory is diminished, and his workpeople find the amount of their weekly earnings reduced in proportion to the lessened production. Hence the use of Indian cotton is confined to the low coarse fabrics, in which price and economy are more regarded than quality, and in which its deficiencies are not so obvious, and any increase in the demand for it only occurs under a deficiency of American supplies.

Now, if we turn to regard the conditions under which the cotton of India is cultivated, we shall find a striking contrast to those we have been contemplating in operation in America. The Indian cultivator is an inert and unintelligent labourer. Capitalist you cannot describe him, for the cattle and implements of husbandry which constitute his wealth are few in number and insignificant in value. The mode in which he performs the operations of husbandry is of the rudest character; has been handed down from time immemorial by his forefathers; is unquestioned by him, and carried on without change. He scratches the surface of the soil to the depth of two or three inches; sows his seed broadcast, or intermingled with other crops; pays no attention to weeding or pruning; and is careless as to the picking, for his crop is sold in anticipation to the bunyia, or native banker, who has advanced upon it, and in whose power he is constantly held, and it is therefore indifferent to him whether he picks the cotton from the ground or carelessly from the tree. He sells by weight, and not by quality. He therefore adulterates, and this system of fraudulent adulteration is carried on by every successive intermediate agent, until the arrival of the cotton at Bombay. Unlike the American planter, he is deprived of the advantages of railways and water communication. His produce is carried hundreds of miles on the backs of bullocks, exposed to all the vicissitudes of weather, and the necessary deterioration which ensues. Can we be surprised if the result of this rude and imperfect system of culture is the production of cotton very inferior in quality to that which the American planter offers to the English consumer, and that the latter gives a preference to the one and discards the other.

But it is said by some advocates of things as they are, that the production of cotton in India is a question of cost and price, and that if you introduce a more expensive system of cultivation, you will add to the former, with doubtful increase to the latter. This appears to me altogether erroneous. I at once admit the capability of India to produce cotton as cheaply as America, and therefore I contend it is not a question of cost and price, but a question of quality. With a better quality would follow a higher price, and with improved cultivation a larger product, fully remunerating for any increase in the cost. The improved estimation in which the article would then be held in the English market would ensure a steady and reliable demand, in place of the present fickle and uncertain one, and the consumer would possess a protection, he has not hitherto had, against a failure in the supply from the Southern States of America.

The problem then to be solved is, "Can India, by any system of improved cultivation, produce a better quality of cotton, and if so, what are the means by which this may be effected?"

Let us first consider the solution offered by the testimony of official records:—

In 1841, the East India Company engaged a number of American planters from the United States, for the purpose of introducing into India a better system of cotton cultivation. The result may be stated in the words of an official despatch by the late Sir Robert Grant, formerly Governor of Bombay, who reports, "That the cotton experiments would not succeed in the Southern Mahratta country, and that the revenue commissioner had made it equally clear that they would not succeed anywhere else; that the experiments had been sufficiently tried and failed." The American planters also stated previously to leaving India, "That the staple of the cotton of Western India is as long as that of the New Orleans, and equally as strong, and it is erroneous to suppose that the introduction of the American varieties could be attended with any benefit to India." Upwards of a quarter of a million sterling was expended by the government upon these experiments, but in no instance did they succeed. In July, 1861, Lord Canning appointed a gentleman in each of the three Presidencies to draw up a handbook detailing the results that had accrued from the past efforts of the government to improve the cultivation of cotton in India. These gentlemen having only the records of failure from which to collect their material, could not do otherwise than report unfavourably as to the utility of endeavouring to improve the growth of this staple. Their adverse conclusions might have been anticipated. Accordingly, we find his lordship expressing himself as follows, in a letter dated July, 1861, addressed to the Cotton Supply Association:—

"The general testimony of the best qualified observers, American as well as English, goes to prove that in the details of cultivation, the native of India has little or nothing to learn from the agriculturists of other quarters of the globe"

Sir William Denison, Governor of Madras, in a letter to the same body, dated October, 1861, writes thus:—

"The extensive districts of what is emphatically called 'cotton soil,' though well adapted to produce 'native cotton,' which is short in the staple, and strong, not to say coarse, in the fibre, is not congenial to the growth of the finer species of American cotton. The experiments which have hitherto been made in the cultivation of cotton on this soil have hitherto been unsuccessful."

If, therefore, we are to be guided by the result of these official records, we must answer the inquiry instituted in the negative, but, unfortunately for their reliability, though, happily, for the interests of India, facts enable us to reply in the affirmative.

Last Wednesday evening, in the interesting paper read before this association by Mr. Shaw, he gave an account of the successful introduction by him of American seeds into the district of Dharwar, not under the auspices of government, though he was a government official, but by the exercise of his own personal influence over the ryots. After contending with difficulties for many years, he established the growth of the best quality of cotton, now extensively grown in India, extending, as he observes, by the last official accounts, over 200,000 acres. It is somewhat singular that the results of Mr. Shaw's labours were unknown to Sir W. Denison, and that at the time he penned the despatch above referred to, Mr. Haywood, deputed as the Commissioner of the Cotton Supply Asso-

ciation and the Manchester Cotton Company, was travelling in one of the Madras districts, and reported as follows:—"I have seen in Bellary, so far as I have gone, finer and healthier-looking plants from American seeds than in Dharwar. The people in this district and the Nizam's territory have for some years grown cotton from American seed, and value it more highly than the native species." On one occasion, when asking a native why he did not go to the Kupput Hills close by, and get gold, as M. Le Souf was then doing, aided by a company at Bombay, the ryot pointed to his American cotton-field, and said, "That is our gold; it fills our houses with money." Again, Mr. Haywood observes, "In some districts 2lbs. of American cotton are produced to one of native from the same area." Of another district he reported, "that the ryot obtained as much as 672 lbs. of this seed cotton to the acre." In Liverpool the Dharwar American seed cotton sells at 20 to 30 per cent. higher than other Indian qualities, and is eagerly sought after by the consumers as a substitute for ordinary American quality. From these unquestioned facts, as to the success of Mr. Shaw's labours in the Dharwar district, we are justified in the conclusion, notwithstanding official records, that India can grow cotton of an improved quality. It is true that samples of every variety of cotton have been frequently exhibited as the produce of India; they are, however, the results of limited experiments, made under European superintendence, and can only be considered as experiments. But, in the case of Dharwar, we have the trial made by field cultivation, upon an extensive scale, and by the agency of the ryot, who, now aware of the value of the exotic seed, is extending its cultivation. Had Mr. Shaw's labours been appreciated by the Government, and followed up by them in other districts, Lancashire would not now have been in want of a good quality of Indian cotton.

The agency by which the introduction of an improved quality of cotton is to be effected in India, appears to me to rest with the government. Mr. Shaw was a practical agriculturist, an able and energetic man, but without the influence he possessed over the ryots as a Government official, an influence all-powerful in India, even his skill and energy would have been unavailing. In all oriental countries the government leads and directs, and India is no exception to this rule. I therefore agree with him that the government, in its capacity as landlord, should take this matter in hand, and appoint a certain number of gentlemen duly qualified to act as agricultural or cotton commissioners in certain selected districts, who should aid the ryot by a distribution of foreign seed and improved implements of agriculture, and circulate information as to the best modes of cultivation. Merchants would follow in the creation of agencies and erection of ginning establishments, and a stimulus would thus be given over a large extent of country, and results produced which otherwise it might take generations to accomplish. I am aware it may be said this work, however important and valuable to the interests both of India and England, does not devolve upon the government by any principle of free trade or political economy. But what is the government already doing in India? Are the undertakings in which it is actually engaged in conformity with the principles of free trade? Why should the growth of opium, the manufacture of salt, the cultivation of tea, the establishment of iron works, be considered as legitimate objects of government enterprise, and yet the improvement of the cultivation of cotton, an object of far greater importance than any of these, be ignored? I do not admit, however, that it is a violation of the principles of political economy. Under the circumstances of our rule in India, I regard it simply as a discharge of the duty of government in its character of a landed proprietor.

From what has been stated of the rude system of agriculture adopted by the Hindoo ryot, it is evident the introduction of European skill and capital is requisite for its improvement. To this, however, there are serious obstacles, and to the more prominent of these I will briefly allude.

1st. The want of roads and other means of communication and transport.

2nd. The system of land tenure, which prevents the investment of capital for purposes of improvement.

3rd. The want of security for capital in the absence of an efficient contract law, and of a system for the registration of contracts, and in the inefficiency of the country law courts. The question of roads for India is one upon which all parties are now agreed, and during the last few years it must be admitted that efforts have been made to remedy the neglect of the past. Much, however, remains to be done, and in districts opened out by railways, tramways, or country roads, will be requisite to develope traffic. Bullock travelling, at the rate of two miles per hour, will not compete with the network of tramways which intersect the Southern states. In the year 1860–61 the outlay in India, under the head "Communications," was as follows:—

	Square miles.	Population.	Expenditure in Rupees.	Expenditure per head.	
				Pie.	d.
Bengal	253,000	40,852,397	1,003,021	5	⅝
N. W. Provinces ...	108,000	30,250,000	1,091,615	7	⅞
Punjaub	95,600	15,467,821	1,294,308	16	2
Bombay	140,407	12,038,113	1,067,180	17	2⅛
Madras	136,872	23,301,697	1,525,545	10	2¼
Ceylon	24,700	1,876,469	1,598,110	164	20⅓

Ceylon expended, therefore, 24 times as much per head of the population as Bengal and the North-west Provinces, and about ten times as much as either the Punjaub, Bombay, or Madras. To this advantage, in facility of communication, with the sale of its waste lands, and the abolition of the Indian policy of land tenure, may be attributed the present flourishing state of Ceylon.

The policy of constructing the roads out of revenue is most costly, as it often occurs that estimates cannot be sanctioned till a considerable part of the year has elapsed, when hasty and desultory demands for labour cannot be met, and a large number of officers stand idle upon their pay. It was in view of these defects, and in order to hasten the construction of necessary public works, that the Cotton Supply Association, six years ago, submitted the following proposals to the East India Company and Board of Control:—

1. That for the purpose of more effectually developing the resources of India, a Commission should be appointed, to be called a Board of Public Works for India, that money should be borrowed for the purpose of forming and making roads, bridges, railways, tramroads, piers, landing stages, increased facilities for navigating the rivers and estuaries of India, and also for works of irrigation.

2. That the tolls and income derivable from such works shall be appropriated first in payment of interest on loans and expenses of management, and the residue shall be applied in redemption of the capital invested by such Board. That the Commissioners shall have power to reinvest all excesses of income beyond expenditure and redemption, provided the sum of twenty millions be not exceeded as a loan.

3. That the Board should have power to borrow any sum not exceeding four millions sterling per annum, for a period of five years, and report annually to Parliament the progress of their works, the amount of loans, and income.

Had this proposal been adopted and acted upon, a much more rapid advance would have been made in the execution of public works, and a more striking change been visible in the traffic of the country.

I may here advert to the discouragements which government too frequently places to the undertaking of public works by private enterprise. The Indus Navigation Company, and the Madras Irrigation Company, are

instances in point, but the most recent is the case of the Manchester Cotton Company, to which I will refer more particularly.

In the spring of 1861, the Directors of this Company, with a view to the opening of a trade with the cotton districts of Dharwar, arranged with the Indian government for the construction of a pier at the harbour of Sedashegur, and the formation of a road from thence to the Dharwar district. Upon the understanding that these works would be at once proceeded with, the directors prepared cotton presses, gins, and other machinery, for transmission from England to Sedashegur. Two vessels have been freighted to that port, and a staff of European workmen sent out, but although the road and the pier were promised to be finished by the end of 1861, neither is yet completed. The operations of the company are therefore suspended, and great loss and disappointment have been occasioned.

It is unfortunate that railways in India were projected more with reference to military and political considerations, than commercial, and thus many cotton-producing districts are very imperfectly served by them. The great central district of Berar, in which is to be found the most extensive cultivation of cotton, had no railway sanctioned to it until the crisis in America arose, and some time will yet elapse before it is completed.

It is admitted that the American planter enjoys a great advantage afforded by navigable rivers, down which he can float his cotton 1,000 miles at the cost of one-eighth of a penny per lb. A similar distance in India would cost twenty times as much. Attention ought therefore now to be directed to affording the ryot similar facilities, and to the formation of canals for the purpose of navigation and irrigation, and thus produce, which can ill afford the cost of railway carriage, could be conveyed without the uncertainty and loss now entailed by bullock traffic.

Upon the question of land tenures, a subject involving political, financial, and commercial considerations of great interest, it is not my intention to enlarge. For some years past opinion, both in India and England, has tended to the conclusion that government should dispose of all waste lands in fee simple, and that the redemption of the land-tax should also be permitted. In 1858, Lord Stanley, by a minute, directed the sale of waste lands in the possession of the government, but this remained a dead letter until Lord Canning, previously to his departure from India, issued his celebrated minute, by which not only were the waste lands to be offered for sale in fee simple, but redemption of the land-tax to one-tenth of the land revenue was sanctioned. This minute has subsequently been suspended by the present Secretary of State for India, Sir Charles Wood, who, in reference to waste lands, has directed surveys to be made, which may occupy years in completion, and has withdrawn permission to redeem the land-tax save in a few special cases, and established in its place a perpetual settlement, surrounded, however, by many reservations, not likely to facilitate its early adoption. A perpetual settlement is certainly an improvement upon existing tenures, but why not permit the purchaser to make his option between a fee simple tenure and perpetual settlement? The position in which the land tenure question now stands is an unsatisfactory one, and any expectations as to its present arrangement promoting the extension of cotton cultivation must be abandoned.

It has frequently been urged upon the manufacturers of this country to send agents into the interior of India to displace the existing middleman, and put themselves in direct communication with the ryot. In the absence of a simple and efficient contract law, and with the corruption of the country law courts, this advice is as absurd as impracticable. Mr. Shaw's authority on this point will not be questioned. He says:—"We hear a great deal of its being the duty of the manufacturers to proceed to India to cultivate cotton, not that such is their duty, for were the whole Chamber of Commerce of Manchester in the present state of India, landed in any of the cotton districts, I have no hesitation in saying (and every practical man conversant with the natives will endorse that opinion), that the only means they would have of procuring a bale of cotton would be through the agency of those very middle-men who hold the ryots in subjection, and who would drive a profitable business also with them." But assuming the attempt were made, the ryot could only be dealt with by a system of advances, to aid him in sowing and preparing his crop. What security has the trader for the return of his advance, or the fulfilment of the contract made between him and the ryot? Upon this question, let us hear the evidence of Mr. Landon, an authority of great weight with Sir C. Wood. He states, in evidence given before the Colonisation of India Committee, July 16, 1858, as follows:—

No. 8,399.—"The native courts are corrupt generally, from the judges downwards. I advanced money on a contract. When the cotton should have been delivered he refused to deliver. I asked him, 'Why do you refuse to fulfil your contract?' He replied, 'If you go to the Court I can keep you out of your money four or five years. In nine months I got a verdict against him. The Court examined a witness one day, then postponed the case a month. The Court then examined other, and again postponed at its pleasure, and so on. The defendant appealed to a Superior Court, who confirmed the decision in my favour for principal without interest. The defendant, though a man of wealth, had no property that I could seize; he had corruptly made it away. After two years I managed to get about 75 per cent., with interest, and paid my own costs. Witnesses can be got to prove anything required. If there were a summary process money could be recovered. The natives practise these frauds upon each other, and complain of the system of administering justice. It took me two years to recover, from first instituting the suit to the final decision, in the Upper Court. So much for Civil Courts."

A more recent authority, the Hon. Mr. Scott, a merchant in Bombay, and a member of the Legislative Council, in a speech made on the 12th April, 1862, in a debate upon the Breach of Contract Bill, is reported to have said:—"No one can consider the establishment of such agencies more desirable than I do myself; no one can anticipate greater benefit from them than I do. Without them I do not think that we shall ever get to the root of the evil, or effect any material improvement in the quality of the Indian cotton. Believing all this, and admitting all this, I must still emphatically declare that no prudent European merchant dare, in the existing state of the law, establish such agencies on a large scale without some system of easy registration of contracts, and without some summary law for the enforcement of contracts, criminal or otherwise—I don't much care which. He would be going to certain loss. On the 6th May, 1852, we contracted with a person in the Dharwar district for the delivery of a certain quantity of cotton, and, according to custom, paid half purchase money in advance. He failed to deliver, and we sued upon the contract. We obtained a decree in the Sudder Ameer's Court on the 23rd November, 1853, and on appeal in the Judge's Court on the 27th November, 1854. The defendant then appealed to the Sudder, and his appeal was dismissed with costs, on the 30th January, 1857. His pro perty was then attached, and almost simultaneously he died. Claimants then rose up against the attachment. We again obtained decrees in our favour, and an appeal was again made in August, 1861. Ten years' fighting for a paltry sum, which would have been abandoned long ago, save that we objected to being "done." The firm to which I belong is the only one on this side of India which has attemped such operations (advances up country) on a large scale, and in my own earlier career in India I had a great deal to do with their management up country. A history of our doings is on the records of

government, and I need not enter upon it here. Suffice it to say that, after fighting against all difficulties for ten years, after expending large sums in machinery, and in the importation of foreign cotton-seed, &c., we were obliged to withdraw our agencies, and abandon altogether a large sum in outstanding advances. What caused our failure? The want of a system of registration of contracts, and the want of some means of summarily enforcing them. Give us these, and we will commence again, and so will many others. Without them we can do nothing."

What testimony can be more decisive as to the utter inefficiency of the existing law of contract and the necessity of its immediate amendment.

Several attempts have been made by the Councils of India to pass a law for the punishment of fraudulent breach of contract, but the Secretary for India has hitherto refused his sanction to them, upon the ground that the law proposed would act oppressively to the native. But where is the distinction in fact between the case of the ryot refusing to fulfil a contract entered into, and that of the English labourer or artisan, and yet the latter, upon refusing to complete his contract, is treated as a criminal, and committed for trial. If this procedure be justified in the case of an intelligent, skilful English artisan, it cannot be considered harsh treatment for a fraudulent Hindoo ryot.

The interruption of the American supply has made itself felt in India by an increase in its exports of cotton. In the year 1860 only 563,200 bales were received in England; in 1861, 986,600; and in 1862, 1,072,400. The estimates of this year vary from 1,200,000 to 1,300,000 bales. Should the former figures be realised, the increase would be more than double the import of 1860—a considerable increase—and yet, perhaps, not so much as might have been anticipated, after the stimulus afforded by the high prices of the two last years.

The present crisis has appeared to some to be the great opportunity for which India has long been waiting. They had hoped that, with the attention of the commercial world directed towards her, and with an unprecedented demand for her native products, her vast resources might at length be developed to their due extent. And could I see any efforts making in the direction of those successfully carried out by Mr. Shaw, in Dharwar, and the government using its power for the removal of hindrances and abuses, then might we anticipate the realisation of such hopes. But in the absence of these efforts, I greatly fear that though the continuance of the American war may, under the influence of high prices, force a considerable production of cotton, yet when the planter of the Southern States is again enabled to enter into competition, the Indian cultivator will have to resume his former subordinate position.

It may be thought that the view presented in this paper is unduly gloomy and desponding, and I must confess that I cannot contemplate the immediate future of the cotton manufacture without very grave apprehension. But may we not hope that beyond this intervening period there are promises of brighter augury, when, with industry resumed, and trade established on a more solid basis, the results of this time of trial shall appear—when the endurance and self-control of the suffering operatives shall win for them the confidence and esteem they deserve—and when they, in turn, shall learn from the aid so freely rendered to them in their need that the social distinctions, which they have regarded with so little favour, have been powerless to isolate them from the universal sympathy of their fellow countrymen—when our excessive dependence upon the results of slave-labour shall no longer furnish a taunt for our enemies, nor awaken the shame of those benevolent men amongst us who have erroneously regarded our compliance with ordinary commercial laws as complicity with slavery itself—but when the very failure of this source of supply shall extend to other lands all those material and social advantages which British capital and civilisation can confer on communities hitherto sunk in barbarism, or oppressed by poverty.

DISCUSSION.

Mr. A. Nesbitt Shaw said it would be out of place for him to pass any encomium upon the very able and interesting paper read by Mr. Cheetham. The few remarks he intended to offer were not altogether founded on his own experience, but more upon the experience of those who were perhaps better qualified than himself to give an opinion on the subject. There was only one way of extending the cultivation of cotton in India—that was to improve its quality; and there was but one way of improving the quality, namely, by introducing the ordinary varieties of the American cotton. There were many persons who held the idea that it was merely a question of price, and that if the manufacturers of Lancashire were willing to give the price, they could get as much cotton from India as they desired. This, in some respects, was true, no doubt, but no manufacturer would give the price for an inferior article when he was able to obtain one of superior quality for the same money. The agriculturists of India perfectly well knew that as soon as the American ports were reopened the demand for Indian cotton would cease, and although the price of cotton at Bombay was now five times as much as it was three years ago, yet the cultivation had scarcely increased. To improve the indigenous Indian cotton, with a view of making it capable of competing with the American varieties, was hopeless. It was as hopeless to attempt to give to the native Indian cotton the character of the American, as to convert white currant trees into red. No man who had seen the native plant could mistake it for Mexican, or New Orleans, or Bourbon, or Sea Island. He might adduce the evidence of a practical man now in Liverpool, who held the idea that nothing was required in India but high cultivation to improve the staple. This gentleman went out to India and cultivated highly the Indian cotton, and at the end of the year he compared its staple with that grown by the ryots. He found it exactly the same. He was not satisfied with this, but exported seeds to several localities, and cultivated them highly; he again compared the products with those of the ryots, and he found no improvement at all. He was not prepared to say that no amount of high cultivation would improve the staple of cotton; but this he did not hesitate to assert, that the safest and speediest way to improve the staple was to get rid of the native plant in those districts where they could grow the exotic, and introduce the New Orleans variety. Moreover, the New Orleans produced nearly double the amount per acre as compared with the indigenous cotton, and would cost no more to cultivate. With regard to the anecdote related by Mr. Bright, of a working-man exclaiming, when told that a fresh supply of cotton would probably soon come to hand, "I hope it will not be from Surat," he (Mr. Shaw) would remark that this exclamation did not express a mere prejudice on the part of the operatives against Indian cotton, but a real objection, founded on the fact that the wages they could earn in working up that cotton were considerably less than in working the American. It was not a mere question of machinery; the existing machinery might work up Surat cotton, but it was a question of profit and and loss to the workman. With reference to the kind of aid which it would be desirable to obtain from the government, he did not ask for any measure in opposition to the rules of political economy, but he believed that, until the government gave a certain amount of aid, they would never grow cotton in India. Twenty years ago, when the American seed was first introduced into India, particularly into the Dharwar district, it was avowedly and openly under the protection of the government collector, who encouraged it in every way, not, however, by putting pressure upon the ryot. No ryot had lost a farthing by the cultivation of American cotton. The collector never

turned a deaf ear to the complaints of the ryots. Many ryots complained that they had lost money by growing American cotton. The collector knew that that was not true, but he never hesitated to listen to them, and he treated their complaints with respect. In the year 1847, there was a comparison made, at Bombay, of this cotton and the native, and, as he had mentioned, the merchants appeared to prefer the native, and he (Mr. Shaw) was taunted with having bestowed a great deal of zeal in the wrong direction, and was told that all he had done was to produce a cotton a little worse than the native. The reports from Liverpool, however, gave a different version of the value of this cotton. When this was seen, the government sent out to India to know why the cultivation of cotton had so greatly fallen off, and the reply sent back was that he (the former collector) had coerced the ryots, and when they were left to themselves the cultivation had fallen off. That was not the true reason; it was because it had been circulated through the district that the American cotton was worse than the native cotton. From information which he had recently received, he had learnt that the Dharwar cotton, though it had been adulterated, had not degenerated, but had improved in staple, and the yield was larger. The question of adulteration was a most serious one. Such was the state of adulteration of the New Orleans cotton in the Dharwar district, that unless the government took up the question in an energetic manner, the whole of this cotton trade would go to destruction. The government had passed an act, one clause of which exacted a penalty of 1,000 rupees, or imprisonment for 12 months, for the adulteration of cotton, and yet the whole of the cotton of the country was admitted to be adulterated. If this law were injudiciously enforced, as matters stood at present, every ryot would give up cotton cultivation, but if government would give them legitimate aid they would get cotton from India, but unless they did that, if they had not already lost all that had been done in Dharwar, they would very soon do so, and they would never get cotton from India capable of competing with that of the American States.

Professor Leone Levi called the attention of the meeting to tables showing the immense proportion which the cotton trade bore to the general trade of this country, both in its imports and exports, and having brought forward statistics in support of that position, proceeded to remark upon the various quarters of the world from which supplies of cotton might be looked for. In the present unhappy political position of America they could look for no present supply, and upon the cessation of hostilities they could not expect for many years to come the customary imports of cotton from that quarter of the world. With regard to Egypt and Turkey, he thought they were not much to be relied upon. There was such a want of good government in the provinces at a distance from the central power, that even if the central government were willing, they could not control the other portions of the empire; and, moreover, they had not that knowledge of the people, or that confidence in them, which would justify their trusting much to them. Therefore he did not agree with those gentlemen who had confident expectations that they would derive any large quantities of cotton from Syria or Egypt. Prof. Levi next referred to the improbability of large supplies from Queensland, Australia, New Zealand, or Natal, on account of the excessively high wages which labour commanded in those colonies. He believed that must for a considerable time, at all events, prevent many of the otherwise cotton-producing countries from affording them any large supplies. In his own mind, there were only three countries which could really give them anything of importance—those were America, India, and last, but not least, Italy. The latter country possessed the double advantage of a large extent of land suitable for cotton cultivation, and a large population, now earning very low wages, ranging from 10d. to 1s. a day, from which the necessary labour could be supplied, with the additional advantage that cotton cultivation was a thing well understood there, from the long period during which it had been engaged in. The productive quality of the soil of Italy was very great. It appeared that whereas in America the average quantity of cotton produced was about 300 lbs. per acre, in Italy it was in some cases 350 lbs., and in others as much as 500 lbs. per acre. There was in Italy a territory of 180,000 square miles capable of producing cotton, and ten millions of people who might be employed in that cultivation. The manufacturers did not require all their cotton to be of the best quality. The largest proportion of cotton worked in this country was of a middling quality, which was just the quality which could be produced in Italy to any extent. He thought it would be of immense benefit to Italy to extend this industry in that country; at the present time its exports were but small, and freights to its ports were high, because there was little or nothing for the ships to bring back. An additional advantage was to be found in the comparatively short distance which the article would have to be brought in order to reach the greatest mart in the world, and the delay of some months' transit, as from India, would be obviated. He hoped the fears entertained with respect to brigandage and such other local troubles would be removed by the energetic action of the government. Prof. Levi concluded by pointing out the great geographical advantages which Italy possessed in its immense extent of sea-coast, whilst, as regarded the interior, there would be abundant means of communication by the railways now in course of construction from the Adriatic to the Mediterranean.

Mr. Thomas Clegg, responding to the call of the Chairman, said he had not attended with a view of taking part in this discussion, and was not prepared to do so; but as his friend Mr. Cheetham had referred to what he had attempted to do, rather than to what he had done, he felt bound to respond to the call which had been made upon him. Although Mr. Cheetham had characterised his paper as a gloomy one, he felt convinced he had done good service in the details he had given of various countries; and having mentioned those countries, he would call upon this meeting to take advantage of them, and as probably most present had friends or connections in some one of the regions to which allusion had been made, he would urge upon them to endeavour each to procure cotton from the particular country with which he was connected. As far as Western Africa was concerned, he was quite aware that the Cotton Supply Association of Manchester looked upon him as an enthusiast, and as holding out promises he had not performed; but there was an old saying which ought not to be despised—"try again." Mr. Cheetham had told them that some little effects had already been produced, and that whereas in the first year he received only one bale of 120 lbs.—an ordinary bale being 400 lbs.—from Western Africa, last year the amount exceeded 900 bales, and that from a country which, only a few years ago, did not export a single bale. He was associated with a body of gentlemen who were endeavouring to develope the resources of Western Africa more fully than had yet been done, and they would find, by the last number of the *African Times*, that cotton had been sent to him from the river Niger, which, in one instance, produced 700 per cent., and in another 800 per cent. of its cost price on the spot. If that was not encouragement to their efforts, he did not know what would be. Mr. Cheetham in his paper, and Mr. Shaw in his remarks, had dwelt largely upon the subject of India. He was prepared to expect that Mr. Cheetham would have held out to them this evening a prospect of their getting the chief, if not the great bulk, of cotton supply from India; but he knew his friend Mr. Cheetham was one of those practical men who were guided by experience rather than theory. The Chairman, in his mills, had tested what East Indian cotton could do, and what it could not do. and that gen-

tleman had arrived at the conclusion that, whenever they got cotton again in abundance from America, or from any other country which produced cotton of equal staple, colour, and cleanness, Indian cotton would again go out of use. He thought Egypt, however, was capable of producing an immense quantity of cotton; and looking to the fact that they had a stable Government there, that Europeans were flocking to that country in great numbers, and that money was being advantageously invested there, he believed it would progress and show a vast increase in the supply of cotton, even beyond the anticipations of Mr. Cheetham. With regard to Italy, he thought it came under the same category as Western Africa. They might look for future results, but they could not expect them at present. He took a tour of the Mediterranean in 1855–6, and included Italy in his route, and he saw growing there, in many spots, cotton which quite astonished the people when he pointed out to them the value of it. Upon the ruins of Pompeii, he found cotton which was worth 15d. per pound, but the people were wholly unacquainted with its value. India could only give them the quantity and not the quality of cotton, and there was a very erroneous impression on the minds of some persons that it was the quantity they wanted rather than the quality. It was not merely the adulteration of the Indian cotton that formed its chief defect, but the shortness as well as the coarseness of the staple. Let it be as well grown and as carefully cleaned as they were able to do, still there was the inherent defect in East Indian cotton which would always prevent its being of that useful class which they got from almost every other country. The Syrian cotton was of short staple, but better than East Indian cotton. The coarseness of the staple was also a serious defect. They could make coarse fabrics out of East Indian cotton, but they could not make the finer ones. They must have the finest Sea Island or the finest Egyptian qualities out of which to make the finest thread, and when he told them that the chairman, in the manufacture of his peculiar article from Sea Island cotton, employed no fewer than 215 individuals for every 1,000 lbs. weight, whilst Mr. Walmsley, and other manufacturers who worked the inferior cotton, only employed about 3¾ hands for the same quantity, they would be able to form some estimate of the difference. Therefore, they would see it was not merely a question of the number of pounds weight of cotton used, but of the employing powers of those different qualities for the great community amongst which they lived. He was not prepared to say more upon this question at present than that he agreed with Mr. Leone Levi as to its great importance, and he could not refrain from expressing his thanks to this Society for having given its attention to this subject. It was a question which concerned not only the Society of Arts, but the government of the country, and the world at large.

The Right Hon. Sir JOHN LAWRENCE, Bart., G.C.B., K.S.I., being called upon by the Chairman, said he had listened to the paper of this evening with great interest, and a great deal of valuable information had been imparted in it. Nevertheless, he could not help saying he thought justice had scarcely been done either to the authorities or to the people of India. He was quite sure that Mr. Cheetham was anxious to hear the truth, and to know what was the real state of things. He was quite sure that all who had been connected with India deeply felt the terrible crisis in which we were placed in this country with regard to the cotton supply, and were most anxious to do all they could to give stimulus to the extension of cotton cultivation in India. The real question was, what should be done to promote that object? What would give the desired impetus, and, at the same time, do what was right and fair towards the people themselves, so that in helping themselves they would at the same time help the people of India? He must say that a great deal of what had fallen from Mr. Shaw quite accorded with his (Sir J. Lawrence's) experience. The experience of Mr. Shaw had been principally in the western side of India, whilst his own had been chiefly in the north-western provinces. For many years he was collector in parts of India where large quantities of cotton were grown, and he must say the experience he had of cotton cultivation was that it was by no means so poorly cared for and attended to as appeared to be the impression of some people. On the banks of the Great Delhi Canal, on the Great Western Canal, and on the Eastern Canal, which ran through the upper part of the Gangetic provinces, there was a very large extent of cotton cultivation, and he did not think English or Scotch agriculturists would say there was better farming of the kind in any part of the world. The people were not only excellent cultivators, but they were trained to it from the time they could walk and think; and the cultivation had always struck him, as it had done others of more practical experience, as being most admirable. The deep ploughing, which was so necessary in a country like England, where they would have to expose the soil to the influence of the sun, was not essential in India: on the contrary, it was injurious. In England they wanted the sun to get at the land and dry it; in India, they wanted to retain the moisture in the land. He believed that long experience and great attention enabled the people in many parts of India to cultivate the land to advantage, and the cultivation of cotton in many districts was, in his opinion, exceedingly good. He was not prepared to enter into the reasons for it, but it certainly was the case that the American cotton had not been generally introduced into the north-west provinces. In a few cases it had been tried, but not to any extent; but one thing struck him, viz., that if the exotic cultivation succeeded so well in Dharwar, how did it happen that it was not extended into the adjacent districts? He did not know the reason for that circumstance, but it seemed to him very extraordinary. There could be no doubt that India had been much kept back by the want of means of communication, but at the same time a good deal had been done in that way of late years, more, he thought, than the people of this country were inclined to allow, for when they spoke of the contrast between the vast peninsula of India and the small island of Ceylon, the comparison was hardly a fair one. In the latter they had no frontier to defend, and no warlike races of people to look after, and a comparatively small expenditure in public works would produce great results in that island, which would not be felt in the vast continent of India. He must say he thought the tenures of land in India had no more to do with the cultivation of cotton, sugar, or rice, than the different tenures of land in England, Scotland, or Ireland, had to do with the agriculture of Great Britain. He believed a wise man, looking to the interests of India, would leave the tenures of land as they existed now. He would perhaps try to simplify them where he could do so, but at the same time would maintain in its principal features the system which he found. That was the only way to make the people happy and contented and appreciate our rule. They forgot that the people who held the land were as much attached to their occupations as we were to our institutions and property in England; and whatever might be good in theory was not the question. They must consider what the people appreciated and loved, and that to which they were endeared by the custom of ages. If they wanted to improve India this was not to be effected by sweeping away existing institutions, but by trying to civilise the people. English capital in India would do a great deal, but it must be judiciously employed by wise, intelligent, and good men, otherwise, good as it was in itself, it would become a curse to the country. They might not always be able to carry the people with them, although the principles they wished to introduce might be good in themselves; and by thus running counter to the feelings of the people they lost not only their money but their credit.

Dr. BEKE said Mr. Clegg having spoken of Western Africa, he would say a word or two with regard to

Eastern Africa, particularly that portion that lay within the dominions of the Pacha of Egypt. In the first place he wished to correct an important statement of Mr. Cheetham's as to the estimated produce of cotton in Egypt for this year. He had it upon the authority both of an eminent merchant in Alexandria, and from the Egyptian consul in this country, that the produce would be 300,000 bales of 500 lbs. each. That description of cotton, as Mr. Cheetham had stated, was not in Egypt in the year 1820. In about three years from the time that cotton was introduced into Egypt it was produced to the extent of 2½ millions of pounds. In 1784 America produced only seventy bags of cotton, and in 17 or 18 years it had not increased in the same way as in Egypt in the three years. The seed which M. Jumel saw growing in the garden of Mahomet Bey in Cairo, was brought from the upper provinces of Egypt, where it grew wild in the most luxuriant manner on even tracts of alluvial soil. He learnt from the last mail that they were now sending cotton from the Red Sea ports to Bombay, a thing which had never been done before; and looking to the fact that Egypt was the native country of cotton, they ought to look for large supplies from that quarter. He had mentioned these facts in Manchester two years ago, but he was not then listened to. Now, however, Egypt was forcing itself into notice.

Mr. Henry Ashworth said the question of cotton growth had been very widely considered as affecting a great many interests in connection with it, but there was one important omisssion, and that was the question of cotton as an article of clothing to the consumer. A very large proportion of the human race now found it necessary to have recourse to cotton in the shape of garments, and that interest had not on this occasion been brought forward as being of leading importance in the consideration of the general subject. In the absence of cotton, it could not be supposed that the hundreds of millions of people in the East could have recourse to a provision of clothing from sheep's wool; moreover, the available quantity of wool was so limited, that even if the climate admitted of their wearing it, the requisite quantity of it could not be produced, and the production of silk was also out of the question. Therefore, cotton had become an indispensable article of wearing apparel, and it was not only an affair of the unemployed manufacturers which they had to consider, but one which deeply concerned the varied interests of the world at large. They were told by Mr. Shaw, in the valuable paper which he read before the Society last week, that cotton had been grown in India at the very insignificant cost of three farthings per pound. He believed they would find, from various other statements, that there was scarcely any natural product that could be so extensively cultivated as cotton, or at so small an expense. It was also stated by Mr. J. B. Smith, the chairman of the previous meeting, and confirmed by Mr. Shaw and other gentlemen, that the same cotton which was raised in India at a cost of three farthings a pound upon the plantation, was ultimately sold in Liverpool at 6½d., and it was very probable that if that cotton were in the market to day, it would sell at from 1s. 6d. to 2s. per pound. It had often been insisted that price would bring cotton. Now, if price would bring cotton, would the cultivator desire to obtain a larger margin of profit on the transaction than the difference between three farthings per pound and 6½d., as in the first instance alluded to, or, as at present, between ¾d. and 1s. 6d. to 2s., ranging as these prices did from eight to twenty and thirty times the original cost of the article. Supposing, further, as they had a right to do, that price would bring an abundance of cotton, how did it happen that India was not sending it, seeing that it could not be said that the price was not sufficiently tempting? There must be something wrong —an interruption of commerce would be found existing somewhere. Some eulogium had, during the evening, been passed upon the Government of India, and upon the alleged impossibility of improving the tenure of land. All this appeared to those who had never been in India somewhat difficult to understand. If there was a good title to the tenure of the land, and if the investment of capital was safe in a country which could produce cotton at three-farthings per pound, which could command so high a price as he had spoken of, upon whom did it rest to facilitate those commercial operations which now impeded our supply? The Indian Council were responsible for the government of that country, and therefore we had a right to receive some explanation so as to know how it could happen that, with an industrious and docile people, with every advantage of climate and soil, we could not now obtain cotton at Bombay of as good quality and as cheaply as it could be obtained at New Orleans. If the advantages of price and quality were equal, no one would hesitate to enter into the trade; it would be extended very largely, and in that way this country would eventually convey to India a large portion of that £40,000,000 a year which hitherto had usually found its way to the Southern States of America. Surely everyone would admit how very important it was to the poor people of India that they should share more largely than they did at present in that enormous amount of money now at the command of the mother country to distribute. They found that the people of Egypt, the people of Italy, of Turkey, and many other parts of the world, had been sagacious enough to discover the advantages to be obtained, but, unaccountable as it might appear, they had thus far been unable to discover that India had made any considerable efforts in that direction. How did it happen that the affairs of India were so ill managed, and that there should be so obvious an indifference to the attraction of £40,000,000 a year? The subject of cotton culture had been again and again brought under discussion, and the obstacle mostly dwelt upon was the tenure of land, and the uncertainties necessarily involved. They all knew that in this country they had various forms of tenure, such as freehold, copyhold, and leasehold, but the security being admitted, the cultivation of the soil went on nevertheless. There was, however, one description of tenure which people in this country were very chary about, and that was a tenure from year to year as tenant at will, and if he was not mistaken, the tenure of land in India was upon a principle equally as bad, and the cultivator was exceedingly impatient to have it improved. Some years ago Lord Stanley issued a despatch to the effect that the waste lands should be sold and a permanent tenure established by purchase. The sale of the lands and the ownership of a proprietary had been spoken of, not only as an attraction to the cultivator, but as the most eligible means whereby the manufacturers of this country could become more nearly independent of other countries for the production of cotton. Lord Canning put in motion his form of resolutions for carrying out Lord Stanley's despatch; sales of land were made, and the people rejoiced in the announcement of a measure so well calculated for bringing about the more extended cultivation, not only of cotton, but of all the productions of India. A proceeding so salutary did not find favour at head-quarters, and the Council of India, with Sir Charles Wood at their head, had, in effect, cancelled that order, and, according to all they heard from India upon the subject, it might be centuries before Sir Charles Wood and his Council had dispossessed the kings of the forest, and other wild beasts of the waste lands, which the people were so anxious to bring into cultivation. Another obstacle to progress was the absence of a proper contract law. It was admitted that British capital and enterprise were indispensable to the progress of India, but if they had neither a sound tenure of land, nor an efficient means of collecting debts, it was enough to make discreet people very chary of investing their money, and he thought no one who had considered the subject would say that India at the present time possessed one or other of these conditions of safety for investment. If capital were deemed safe in India, it

would be embarked there, and then they would not find, as they now did, so many companies springing up and undertaking the growth of cotton in other parts of the world. There had been two or three attempts made to carry a contract law in the local legislature of India, but those attempts had been overruled by Sir Charles Wood, on grounds which he (Mr. Ashworth) did not understand. Indeed, it would appear that the proceedings of Sir Charles Wood in obstructing the contract law had been deemed to require the aid of great names by way of endorsement, and within the last week or two 150 signatures had been obtained, of bishops, lawyers, military men, and old Indian officials, in token of approval of his policy; but it was a singular fact, that out of the 150 there was the name of only one merchant; and the affairs of money belonging to the merchant rather than to the other classes, he deemed such a voucher of no value whatever. The *Times* newspaper, which seldom was so naughty as to abuse the Indian Government, could not refrain from inflicting some damage upon the extraordinary document to which he had just referred, and in referring to the condition of the Indian cultivator it had reasoned as follows:—"It is miserable to be poor; but that misery is doubled if a harsh government purposely deprives a poor man of that support which is indispensable to the industry by which he lives." Now, they all knew that the people of India were poor; they knew that of necessity they were great money borrowers; and so long as they were governed in a way which hindered the operations of the lender in making advances to the borrower, they had no reason to suppose that cotton cultivation would be carried out in the enlightened and effective manner which had been proposed and successfully adopted by Mr. Shaw.

Mr. F. Bashford said he had resided in the interior of India for many years, and could testify to much of the Province of Bengal being well suited for the growth of cotton. He had seen Sea Island grown there; and the muslins of Dacca, all from locally grown indigenous sorts, were proof that other cotton of good quality could also be grown in that province. The production had of late years been extremely curtailed, and the consumption entirely confined to local domestic purposes. All that was now necessary to extend the cultivation was a paying price to the ryots superior to what other crops yielded them; such a price was now ruling, and should it exist up to next sowing season, there would be from India generally, in the following year, far more than double the quantity they had yet had. The fear, however, was that this increased quantity would not be of better quality; more probably inferior. Extremely high prices generally engendered a greater desire for quantity, and careless preparation was the consequence. To remedy this evil, Manchester merchants must send out proper machinery to clean the cotton, and a sufficient number of experienced men to teach the natives how to use this improved machinery, and practically show them the increased value of the fibre so prepared. He was quite sure that if this were done, in one year every desire of the manufacturer would be realised. The natives were as anxious for profit as any class of men in the world; they were as easily taught, and, when their own interest was at stake, as tractable and reasonable as our own agriculturists. If they were practically shown that a greater profit was to be made by a superior article, and the mode of preparing it, there would be nothing wanting on their part. Government assistance was not necessary, except in the distribution of seed, which the magistrates and collectors would do better than private individuals, from having establishments in every village; this should be given them free of cost. The interference of middle men was the great bane of all India; they fed upon the vitals of the ryots, and effectually prevented any improvement in their position. Poverty was the unfortunate normal state of almost all the agricultural class in India, and, in consequence, they were too frequently compelled to avail themselves of these men for advances, and if a fair rate of interest was all they asked for, there would be nothing objectionable; but the practice was to advance about one-fourth of the expected value of the whole crop, and an undertaking was exacted that the entire produce should be at the disposal of the middle man, at a certain fixed rate below the market value. This gave him a certain interest or profit upon a sum frequently several times the amount of his advance; he had no risk of a falling market, and the interest the ryot should have for his own capital was all taken away. The ryot, from taking this sometimes very trifling advance, was deprived of all control of his property, and the middle man grew rich while the ryot rarely advanced his position. Was it to render legal such acts as these that a more stringent contract law was desired? The natives were quite as willing to perform their parts in all honest contracts as a similar body of Europeans would be. Through a period of twenty years, he (Mr. Bashford) could scarcely remember an engagement not being fulfilled as far as practicable, or a reasonable contract broken. Let the natives be treated fairly, and they would do their part of the bargain; but if they were expected to give cotton or indigo or silk at a less price than it could be grown for, resistance must be anticipated. Labour had become scarce and dear in India, and rents had generally advanced, so that cotton could now scarcely be grown at 5d. per lb. unless the quality was improved, which he hoped the Manchester men would encourage by sending out men and machinery. He might instance an analogous article—silk. In 1837, when he first landed in Bengal, this staple was of the lowest character, but in 1858, when he left India, it was second in quality only to Italian, a general improvement in value and usefulness of fully 20 per cent. having taken place. This improvement was brought about by instructing the natives, and he felt sure cotton would benefit by the same simple process. The ryots of Bengal had a great hardship to contend with in the peculiar nature of their rent-charge, and what he (Mr. Bashford) considered a great drawback to the delopment of the natural capabilities of the soil of India—the sliding scale of rent. The ryot would take his holding at a certain rate; if he grew rice or oil-seeds, this was not altered; but if he improved the ground and made it suitable for mulberry, sugar, tobacco, cotton, &c., he became liable to be called upon for an increased rent, possibly absorbing the whole of his expected gains from the new crop, and discouraging future improvements.

The Chairman said it was now his very agreeable duty to propose that the hearty thanks of the meeting be accorded to Mr. Cheetham for the very valuable contribution to cotton literature and cotton history with which he had favoured them. He would say he had seldom heard a paper more replete with interesting facts. He had had the pleasure of Mr. Cheetham's friendship and acquaintance for many years, and he thought the commercial community was very much indebted to him. Mr. Cheetham occupied the position of a member of Parliament for South Lancashire for a considerable period, and he sincerely wished they had the benefit of his services at the present time. He had also filled the position of chairman of the Cotton Supply Association of Manchester, and his feelings and services had always been identified with progress. Touching the subject under discussion, he would observe incidentally, that he thought Mr. Leone Levi was not correct in saying that the scarcity of labour was a difficulty in the way of growing cotton in our colonies. The truth was, all the cotton which was consumed in Great Britain could be produced by the labour of less than a million of people, and such a number of labourers could easily be introduced into Australia. Such a number could even be concentrated upon a comparatively small spot in India, or in the British West Indies, or in Natal. There was no difficulty but the want of will and the lack of effort. He would observe with regard to the distinguished gentleman, Sir John Lawrence, who had recently addressed them, that he was sure this meeting would regard him as one of the beneficent rulers of India—a gentleman who,

by his conquests, had added to the lustre of the British arms, and by his administrative ability had done honour to our rule in that country. We were all proud of our great Eastern dependency, but in the possession of British India we should like to see our commerce extended, and the country thoroughly established. We should also like to see the restrictive system, which he feared prevailed there, abolished. In a country of such enormous extent as India, with its fertile valleys and rich plains watered by mighty rivers, was it credible that, inasmuch as a piece of ground less than some of our English counties would suffice to grow all the cotton we required, that in all that splendid territory such a spot could not be found? Did not some blame for neglect rest with the authorities, in not having taken such steps as would have rescued England at this juncture from the distress that had been inflicted upon one of the most industrious communities upon the face of the earth? They were imperilling the position of nearly three millions of people in the manufacturing districts. To come to the rescue of these three millions would be a work of great merit. He had the most thorough and profound conviction that India was capable of not only producing the quantity, but also the quality of cotton they wanted. He entirely endorsed the opinion of Mr. Shaw on that point; and he would observe, with reference to the statement of his friend Mr. Cheetham, concerning Sir William Denison's opinion of cotton growing in India, that he had had the satisfaction of receiving from Sir W. Denison, a few months ago, a letter, in which he said that India was capable of supplying the great bulk of the cotton most used in England—that was the middling quality of New Orleans. That was all they asked for; and seeing there were many gentlemen present connected with India, he hoped that such facts as had been stated by his friend Mr. Ashworth, the President of the Chamber of Commerce of Manchester, and other gentlemen, would have due consideration. He was not without hope, but at the same time he was convinced that, unless an effort was made, they should continue to be oppressed with the state of destitution which unhappily now prevailed. The Chairman concluded by proposing a cordial vote of thanks to Mr. Cheetham for his valuable paper.

The vote of thanks having been passed,

Mr. Cheetham, in acknowledging the compliment, observed that he had listened with much interest to the observations of Sir John Lawrence, for whose qualifications and experience as an Indian statesman he had the highest respect. But he would not conceal the fact that between the government of India, as now constituted, and the manufacturers of Lancashire, there existed a wide difference of opinion, and on the part of the latter a feeling of deep discontent. It appeared to him that much of the leaven of official bigotry and opposition to all improvement—the distinguishing feature of the old East India Company—yet remained in official quarters; and sure he was that, so long as that spirit presided over the councils of India, so long would progress be repressed, and all hope of realising the results of an enlightened policy of administration must be abandoned.

Professor Levi placed on the table for inspection several specimens of cotton of various kinds, principally Italian, and kindly lent various statistical diagrams to aid in the elucidation of the subject.

The Secretary announced that on Wednesday evening next, the 4th March, a paper by Mr. George R. Burnell, "On the Influence of certain Social Institutions on the Progress of Art in this and in Foreign Countries," would be read.

PRIZES FOR ESSAYS IN THE COLONIES.

The following advertisement has been published:—

"The Operative and Labouring Classes of the United Kingdom are invited to Compete for the Prizes offered below for the Three best Essays on the following subjects:—

"'The advantages accruing to the nation, collectively and individually, from the possession of its various colonies, considered in economical, political, and moral points of view.'

"For the best Essay .... £30.
"For the second best......... £15.
"For the third best .... £10.

"Umpires:—

"Sir Henry Young, C.B., late Governor of Tasmania.
"The Archdeacon of Middlesex.
"Stephen Walcott, Esq., one of H.M. Emigration Commissioners.

"The Essays are to be sent in on or before Saturday, May 30, 1863, to the care of the Rev. John Philip Gell, Notting-hill, London, W., who will distribute the prizes, and who must be satisfied that the writers of the successful Essays belong to the labouring or operative classes."

ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

A special meeting of the Executive Committee of this Association was held at the Offices, 41, Corporation-street, Manchester, on Tuesday, January 20th, Hugh Mason, Esq., Vice-President, in the chair; in order to take into consideration a retrospect of the transactions of the Association during the past year of 1862; when Mr. L. E. Fletcher, chief engineer, presented his annual report relating to matters of an engineering character, from which the following facts are extracted:—

It appears that all the boilers under the care of the Association have received their full complement of examinations during the past year, including an annual visit of inspection from the chief engineer; while the report goes on to say, "820 of these boilers have been examined 'Thoroughly,' that is, when empty and cold, when the inspector not only gets inside them, but also goes up the flues, so as to ascertain the condition of the plates and seams of rivets throughout. The number of these 'Thorough' examinations this year is higher than it has been in any preceding one since the commencement of the Association, and is nearly double that of last year." In consequence of this increased number of "Thorough" examinations, it was stated that a larger number of defects than usual had been revealed, and which would otherwise have been unknown; an additional illustration of the importance of these "Thorough" examinations. "The defects discovered in boilers are mainly of two classes, one relating to their construction and the other to their condition. Under the first head, namely, that of construction, 196 recommendations had been made, which are as follows:—

"In 153 boilers the internal flue tubes have been recommended to be strengthened by hooping.

"In 18 boilers the shells have been recommended to be strengthened at the steam domes by stays of angle iron, &c.

"In 9 boilers the shells have been recommended to be strengthened at the ends.

"In 16 boilers the load on the safety valves has been recommended to be reduced."

Under the second head, namely, that of condition, 85 defects had been discovered, all of which were considered dangerous; they are as follows:—"Fracture of plates and angle irons, 13; blistered plates, 1; furnaces out of shape, 12; corrosion, 37; defective safety valves, 5; defective water gauges, 9; defective blow-out apparatus, 7;" others, not actually dangerous, but still unsatisfactory, were then

given, which need not here be repeated. The report then went into a detailed consideration of the defects discovered under each of the above heads; some of the remarks on corrosion may be given.

"Corrosion is found to be going on in all boilers more or less, and it will be seen that the greatest number of dangerous defects in the preceding table are to be found under this head.

"In one case a boiler set upon a mid-feather wall 15 inches thick, had a channel eaten right along it about 8 inches wide, which ran down the centre of the seating, while the plates at the edges of the brickwork appeared quite sound, and the danger consequently passed for some time unsuspected. In a second instance, with a mid-feather two feet wide, the plate was found to be eaten almost through from nearly one end of the boiler to the other—while in a third, where lime had been allowed to come in contact with the boiler at the mid-feather, the plate was completely pulverised, and could be carried away in handfuls. In a fourth case, a vertical tubular boiler had been placed close to a wall, one part being in actual contact. Damp in the brickwork set up corrosive action in the plate, which being concealed by the position, went on undetected until the metal was completely eaten through, and a piece blown out by the pressure of the steam. The original plating of the boiler was thick, the pressure low, and the corrosive action local, only affecting a surface of about 12 inches square, so that the rent did not extend."

"Examples of corrosion might be multiplied indefinitely; enough, however, has been said to show the importance of having all parts of the boiler accessible to examination, the flues sufficiently capacious, and the seatings as narrow as possible, and also of having the brickwork removed occasionally, at all events in places, so as to ascertain the condition of the plates, since to conclude that the parts concealed are in the same condition as those in view has been found in practice to be fallacious."

Under the head of Explosions it was stated:—"It is to be regretted that no means exist of ascertaining the whole number of steam boiler explosions that occur throughout the United Kingdom, and there can be no doubt that many are recorded at all. There are known, however, to have occurred during the last year, no less than 31 explosions, from which at least 87 persons have been killed, and 88 injured. Of the number of lives lost by some of the above, no account could be obtained; while from one of them as many as 29 persons were killed and 12 injured; from a second, 12 were killed and 24 injured; and from a third, 6 were killed and 8 injured."

"The following list gives the description of boiler to which the explosions have occurred, with the number of each class, as well as of the persons killed and injured:—1 Haystack Boilers—12 persons killed and 5 others injured; 6 plain cylindrical egg-ended boilers—6 persons killed and 6 others injured; 3 iron work boilers—47 persons killed and 44 others injured; 3 plain single-flued Cornish boilers—2 persons killed and 2 others injured; 2 plain double-flued Lancashire boilers—4 persons killed; 3 locomotive boilers—4 persons killed and 2 others injured; 1 agricultural boiler of tubular portable construction—4 persons killed and 4 others injured; 1 kitchen-range boiler—1 person killed. Also 8 other boilers, of the construction of which no reliable information could be obtained, but from the explosion of which 27 persons were killed and 22 others injured."

An analysis of the causes of explosion then followed, the summary of which is as follows:—"Of 31 explosions which have happened during the year 1862, 11 occurred to externally fired boilers, from failure of the plates exposed to the action of the fire; 3 resulted from internal corrosion, and 3 from external; in addition to which, 4 were due to improper original construction, one to shortness of water, and another to accumulated pressure through want of a safety-valve; while 7 occurred at a distance which precluded a personal investigation of their causes, at the same time that no reliable information could be obtained with regard to them."

It was also stated that since the foundation of the Association eight years ago, "It has been found, upon limited inquiry only, that throughout the United Kingdom no less than 213 explosions have occurred, which have been attended with the loss of 472 lives, in addition to serious injury to 512 persons, and considerable damage to property."

Home Correspondence.

THE SUBMARINE TELEGRAPH.

Sir,—I ask permission to say a few words in your *Journal* on the subject of "Marine Telegraphy." The immediate point upon which I propose to write involves the difficulties in submerging and laying of cable. No doubt these difficulties may, as observed by Mr. Webster in his able paper on this subject, be "reduced to certainty" by experiment; but when the various characters of sea-bottom are taken into consideration, it is to be feared that experiment must necessarily be of a very multifarious and experimental character.

Now, as I understand Mr. Webster, he gives the following as rules incidental to the submerging and laying down of a cable, viz.:—

1. That a cable cannot at first be laid down so as to form a straight and regular line.

2. That curves and flexures of various and opposite characters are formed which are dependent on the circumstances of submerging and laying down.

These, no doubt, are what I may call the "incidents" attending a cable on its reaching a sea-bottom. Mr. Webster gives several illustrations in support of his views, and which are tersely and forcibly stated by this gentleman. Thus, Mr. Webster says:—"If the cable sinks faster than the speed of the ship, the concavity of the curve will be upwards or towards the surface of the water, and the convexity of the curve towards the bottom; but the cable in attaining this position will have presented a curve having a contrary flexure, in the language of geometricians, which, in a cable of great weight and thickness, may lead to serious inconveniences."

The substantial question is, Is there any mode of avoiding these curves and flexures? We may pass by the characteristics of such curves and flexures as the mere circumstances of a common difficulty. A rope is always liable to coil, as is well-known, unless it be kept in a state of tension. Now, what I suggest is, that the speed of the vessel and the submerging of the cable should be so arranged as to keep the cable in a state of tension. I beg leave respectfully to press this as a rule which, I think, will work out and eventually overcome the difficulties in question, and that without any auxiliary appliances. If the rule I suggest be adequate, experiments in a short line of water will, I doubt not, give results which will soon furnish a table by which the submerging process can be regulated. It will be obvious that this process can only be carried on in calm weather. The consequences of a "heavy sea" are, as it seems to me, beyond all control, except so far as brought within this rule of tension. That is a branch of the subject with regard to which I have no suggestion to offer, and I doubt whether it be within human contrivance to overcome such a difficulty. After all, modern science is only the application of old rules, since, as Solomon truly says, "There is nothing new under the sun." I am, &c.,

J. CULVERHOUSE.

3, Compton-street, Ball's-pond, Feb. 13, 1863.

A NEW EDUCATIONAL MOVEMENT.

Sir,—Will you allow me to invite the attention of your readers to a movement which I have had the honour of originating at the College of Preceptors, in favour of ap-

plying to Parliament for a Scholastic Registration Act, and which is receiving very general and influential support? It is proposed that all schoolmasters and teachers now engaged in the profession, of whatever class, be registered; but that after some future date to be specified, only persons holding degrees, recognised diplomas, or Government certificates, be registered, without which no person be entitled to prosecute any claim for scholastic instruction in the courts of law. The objects desired are:—To raise the scholastic professsion, by the ultimate exclusion of incompetent persons; to place the education of youth in the hands of duly educated men; to encourage the study of education as a science; to enable the public to distinguish between qualified and unqualified schoolmasters; and to give the profession a legally recognised position. A Council, consisting of persons chosen by the Universities, by the Committee of Council on Education, by the College of Preceptors, and by other Educational Institutions, with others nominated by her Majesty's Privy Council, would carry into execution the powers of the Act; and no man's name could be struck off the register, when once entered, unless some legal charge could be brought against him. Qualified educators would be registered irrespectively of their religious opinions or demonstrations. The proposed Act would not interfere in the least with the liberty of the schoolmaster, any more than the Medical Act does with that of the surgeon; each would be as free to arrange his own affairs as at present. I am, &c., B. R.

Aldershot, February 4th, 1863.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Entomological, 7.
Royal Inst., 2. General Monthly Meeting.
Medical, 8½. General Meeting for Election of Officers and Council. Dr. Routh, "On some Points in the Treatment of *Prolapsus Uteri.*"
Asiatic, 3.
Medical and Chirurgical, 8. Annual Meeting.
Royal United Service Inst., 8½. Capt. G. B. V. Arbuckle, "The Application of Iron to Forts and Ships."

Tues. ...Civil Engineers, 8. 1. The Rev. J. C. Clutterbuck, M.A., "The Perennial and Flood Waters of the Upper Thames."
Pathological, 8.
Photographic, 8.
Ethnological, 8.
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."

Wed. ...Society of Arts, 8. Mr. G. R. Burnell, "On the Influence of certain Social Institutions on the Progress of Art in this and Foreign Countries."
Geological, 8.
Pharmaceutical, 8.

Thurs...Royal, 8½.
Antiquarian, 8½.
Linnæan, 8. 1. Mr. Frederick Smith, "On the Geographical Distribution of the Aculeate *Hymenoptera* of the Eastern Archipelago." 2. Mr. Andrew Murray, "Description of two new Conifers from the Rocky Mountains." 3. Dr. John Harley, "On the Parasitism of the Mistletoe (*Viscum album*)."
Chemical, 8. Mr. J. B. Lawes, "On the Assimilation of Nitrogen by Plants."
Royal Inst., 3. Dr. E. Frankland, "On Chemical Affinity."

Fri.......Philological, 8.
R. Society Club, 6.
Royal Inst., 8. Dr. Miller, "On the Most Recent Spectrum Discoveries."
Archæological Inst., 4.

Sat.......Med., 5. Anniversary Oration, by Dr. Habershon.
Royal Inst., 3. Professor Max Muller, "On the Science of Language."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered during the Vacation 1862.

Par. Numb.
429. Charges on Foreign Trade (Customs' Act, 1860)—Report.
450. Maynooth College—Return.
444 (1). Standing Orders Revision—Report and Evidence.
495. Registry of Deeds (Ireland)—Returns.
492. Roman Catholic Chaplains (Ireland)—Return.
496. Treasure Trove—Return.
499. Navy (Victualling Department)—Return.
370. Inland Revenue and Customs' Establishments—Report.
43 (7). Trade and Navigation Accounts (31st July, 1862).
401. Prosecution Expenses—Report and Evidence.
410. Population, Houses, &c.—Return.
472. Youghal Union—Return.
483. Great Southern and Western and Limerick and Castle Connell Railways—Lords' Paper.
497. Beer—Return.
502. Poor Relief (Lancashire, &c.)—Return.
504. Hainault and Epping Forests—Return.
505. Local Government Act (1858)—Fourth Report.
509. Lunatics—Return.
270. Pilotage—Abstract of Returns.
351. County Court Committals—Abstract of Returns.
390. Sugar Duties—Report.
418. Hydrographical Surveys—Return.
421. Sydney Branch Mint—Report and Evidence.
471. Infirmaries and Fever Hospitals (Ireland)—Return.
487. Gas (Metropolis) Act—Accounts.
398. Railways—Return.
411. Weights and Measures—Report and Evidence.
455. Newcastle-upon-Tyne Trinity House—Return.
511. Ramsgate Harbour—Return.
307 (A 3). Poor Rates and Pauperism—Return (A).
475. Colonial Governors, &c.—Return.
502 (1). Poor Relief (Lancashire, &c.)—Return.
416. Friendly Societies—Report of the Registrar.
486. Injury from Noxious Vapours—Lords' Report.
491. Burial Act—Returns.
43 (8). Trade and Navigation Account (31st August, 1862).
470. Ecclesiastical Commission—Report.
478. Public Income and Expenditure—Return.
503. Havens, Mr. W. R.—Copy of Correspondence.
508. Ecclesiastical Commission—Return.
325. County Treasurers—Abstract of Accounts.
307 (A 4). Poor Rates and Pauperism—Return (A).
453. East India (Godavery River)—Return.
493. Tobacco (Liverpool)—Return.
502 (2). Poor Relief (Lancashire, &c.)—Return.
467. Public Accounts—Third Report from Committee.
199. Health of the Royal Navy—Statistical Abstract.
43 (9). Trade and Navigation Accounts (30th September, 1862.
365. Woods, Forests, and Land Revenues—Fortieth Report.
307 (A 5). Poor Rates and Pauperism—Return (A).
489. Electric Light—Mr. Faraday's Report.
498. Newspapers, &c.—Return.
457. Harbours and Passing Tolls, &c., Act—Return.
448. Ordnance—Report from Committee.
441. Railway, &c., Bills—Return.
470. Ecclesiastical Commission—Report, Evidence, &c.
185. Grand Jury Presentments (Ireland)—Abstract of Accounts.
506. Chelsea Bridge—Return.
220, 414, and 467. Public Accounts—First, Second, and Third Reports and Evidence.
477. Civil Service Estimates—Return.
507. Navy (Dockyards)—Returns.
502 (3). Poor Relief (Lancashire, &c.)—Return.
468. Poor Relief—Third Report from Committee.
501. Cost of Relief (Lancashire, &c.)—Return.
43 (10). Trade and Navigation Accounts (31st October, 1862).
479. Supply—Return.
307 (A 6). Poor Rates and Pauperism—Return (A).
502 (4). Poor Relief (Lancashire, &c.)—Return.
370 (1). Inland Revenue and Customs' Establishments—Index to Reports.
470 (1). Ecclesiastical Commission—Index to Reports.
43 (11). Trade and Navigation Accounts (30th November, 1862).
490. Westminster Bridge—Return.
469. Sewage of Towns—Second Report from the Select Committee.
307 (A 7). Poor Rates and Pauperism—Return (A).
484. Savings' Banks—Return.
474. Customs' Tariffs (Colonies)—Return.
500. Private Bills—Return.
510. Education of Pauper Children—Return.
307 (A 8). Poor Rates and Pauperism—Return (A).
250. Bills—Benchers' Jurisdiction and Authority.
254. ,, Church Rates Commutation (No. 2).
North America—Further Correspondence (Part 12).
China (Rebellion in)—Further Papers.
Naples (Treatment of Political Prisoners and Arrest of Mr. Bishop)—Papers.
Inland Revenue—Sixth Report.
Barrack Works—Report of a Committee.
New Zealand—Papers.
Poor Law Board—Fourteenth Report.
Colonial Possessions (Part II.)—Reports.
Thames Embankment (Surrey Side)—Report
Census of England and Wales (1861)—Population Tables, vol. I.
Volunteer Force in Great Britain—Report of Commissioners.
Sewage of Towns—Second Report of the Commission.
Dockyards and Steam Factories (Cost of Manufacturing Articles)—Balance Sheets.
Colonial and other Possessions of the United Kingdom (Part 7)—Statistical Tables.
Trade and Navigation of the United Kingdom (1861)—Annual Statement.
Miscellaneous Statistics of the United Kingdom (Part 4).

Session 1861.

324 (C 1). Poor Rates and Pauperism—Return (C.)

Delivered on 7th and 9th February, 1863.
1. Public Income and Expenditure—Accounts.
6. Metropolitan Board of Works (Financial Transactions)—Return.
1. Bill—Salmon Fisheries (Ireland).
Prince of Wales's Marriage—Treaty with the King of Denmark.
Belgium (Joint Stock Companies)—Convention.
Belgium (Commerce and Navigation)—Treaty.
Poor Relief (Scotland)—Seventeenth Report of the Board of Supervision.
Greece—Correspondence respecting the Revolution.
Rome—Correspondence relative to the Affairs of.
North America—Despatch respecting the Civil War.

Delivered on 10th February, 1863.
2. Bills—Church Rates Abolition.
4. ,, Qualification for Offices Abolition.
5. ,, Judgments, &c.—Law Amendment.
7. ,, Drainage of Land (Ireland).

Delivered on 11th February, 1863.
5. Public Income and Expenditure (1860-61 & 1861-62)—Account.
23. General Committee of Elections—Mr. Speaker's Warrant.
Italy (Brigandage)—Papers.
Japan—Correspondence respecting affairs in.

SESSION 1862.
494. Prisoners—Return.

Delivered on 12th February, 1863.
7. Gold Coinage—Return.
9. Irish Reproductive Loan Fund—Account.
17. Flogging (Army and Militia)—Return.
18. Militia (Number of Months Embodied)—Return.
22. Charitable Funds—Return.
20. Police (Counties and Boroughs)—Reports of Inspectors.
3. Bills—Endowed Schools.
8. ,, Corrupt Practices at Elections.
10. ,, Benchers' Jurisdiction and Authority.
11. ,, Affirmations.
12. ,, Church Rates Redemption.
13. ,, Illegitimate Children (Ireland).

SESSION 1862.
Miscellaneous Statistics of the United Kingdom—Part IV. (corrected Pages).

Delivered on 13th February, 1863.
13. Army (General Officers)—Return.

SESSION 1862.
502 (v.) Poor Relief (Lancashire, &c.)—Return.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, February 13th*, 1863.]

235. C. F. Ash, 20 and 21, Upper Thames-street—Imp. in the manufacture of cornices, joints, and laths of bedsteads and other articles of furniture.
237. W. Rollason, jun., Birmingham—Imp. in the manufacture of metallic boxes.
239. J. Edmondson, Frizinghall, near Bradford, and T. Ingram, Bradford—Imp. in looms and apparatus for weaving.
240. T. Gordon, 41, King-street, Soho—An improved method of, and apparatus for, damping and affixing postage stamps to letters.
241. D. E. Hughes, Gresham-house, Old Broad-street—Imp. in means or apparatus for effecting telegraphic communications.

Dated 28th January, 1863.
243. H. B. Barlow, Manchester—Imp. in preserving timber, and in apparatus employed therein. (A com.)
245. T. Parkinson, Bury—Imp. in carding engines.
247. E. F. Prentiss and J. C. Sellars, Birkenhead—Imp. in treating rock oil, petroleum, paraffin oil, coal oil, and paraffin and other like mineral oils, and products therefrom.
249. H. O. Cook and E. G. Terrey, 12, Lower Clifton-street, Finsbury—Imp. in propelling ships and vessels, and in apparatus employed therein.
251. R. Ward, Newcastle-on-Tyne—Imp. in locking-up or fastening forms of type or other printing surfaces.
253. J. Platt, 10, Charlotte-street—Imp. in rotatory engine.
257. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of braid, and in machinery or apparatus employed therein. (A com.)
259. E. G. Muntz, Birmingham—Imp. in securing axles and axle boxes.

Dated 29th January, 1863.
276. F. G. Stuber, 1, St. James's-road, Brixton—Imp. in the construction of air-tight boxes, cases, cupboards, and similar vessels.

Dated 30th January, 1863.
278. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus for cleansing chimneys and other flues. (A com.)
280. J. Cocker, Liverpool—An improved turnstile especially applicable to omnibuses and other vehicles to show or indicate the number of passengers that have been carried.
282. W. E. Newton, 66, Chancery-lane—Imp. in the couplings for railway carriages. (A com.)

Dated 31st January, 1863.
284. M. Smith, Heywood, Lancashire—Certain imp. in looms for weaving.
286. T. Bennett, Worcester—Improved arrangements for obtaining pictorial back-grounds, fore-grounds, and perspectives, when taking photographic portraits or sun pictures.
288. F. Tolhausen, 17, Faubourg Montmartre, Paris—New or improved apparatus for cleaning the beams of mules and spinning frames, collecting the dust and waste thereof, and also for cleaning the flooring underdeath the mule carriages. (A com.)

Dated 2nd February, 1863.
292. F. G. Grice, West Bromwich—Imp. in machinery for the manufacture of bolts, spikes, rivets, and screw blanks.
296. W. C. Barnes, Enfield — Imp. in means or apparatus for shaping, rolling, or compressing metal.

Dated 3rd February, 1863.
300. C. Smithies and G. L. Smithies, Manchester—Certain imp. in preparing and bleaching "Rheea," and other fibrous materials and fibres, which improvements are also applicable to bleaching yarns or piece goods.
302. G. Holcroft, Manchester—Imp. in preparing cotton for the operations of spinning and weaving.
304. J. Fletcher, Droylesden, near Manchester, and H. Bower, Halifax—An improved injector or apparatus for feeding boilers with water.
306. T. L. Jacobs, Burton-on-Trent, Staffordshire—An improved mode of and apparatus for cleaning casks.
308. W. E. Newton, 66, Chancery-lane—Imp. in reflectors. (A com.)

Dated 4th February, 1863.
310. J. Mellor, Manchester—Imp. in apparatus to be used in distilling, subliming, and drying.
312. T. Bradford, Manchester—Imp. in machinery or apparatus for washing, wringing, and mangling clothes or other textile fabrics.
314. G. T. Bousfield, Loughborough-park, Brixton—Imp. in postage revenue, and other stamps, and in apparatus for post marking and cancelling postage and other stamps. (A com.)

Dated 5th February, 1863.
324. J. Gill and J. Parkin, Far Headingley, near Leeds—Imp. in apparatus for polishing yarn, twine, thread, and other similar materials.
326. H. Dircks, Blackheath, Kent, and J. H. Pepper, 309, Regent-street—Imp. in apparatus to be used in the exhibition of dramatic and other like performance.

[*From Gazette, February 20th*, 1863.]

Dated 24th October, 1862.
2868. J. Wright, 12, Copthall-court, Throgmorton-street—Imp. in the construction of seamless stays. (A com.)

Dated 25th November, 1862.
3162. W. B. Caulfield, 30, Queen-street—A new kind of porous stems for tobacco pipes.

Dated 30th December, 1862.
3479. W. Clark, 53, Chancery-lane—Imp. in governing apparatus. (A com.)

Dated 9th January, 1863.
72. C. Worssam, Commercial Wharf, Kingsland-road—An improved lithographic press.

Dated 21st January, 1863.
177. J. W. Meears, 4, Whistler-court, Cannon-street—A new or improved method for making sash frames and sashes, and suspending the same by atmospheric or gas pressure.

Dated 26th January, 1863.
227. J. B. Fell, Sparkbridge, near Newton in Cartmel, Lancashire—Imp. in working railway engines and carriages on steep inclines.

Dated 28th January, 1863.
255. S. W. Francis, Gray's-inn-road—Imp. in revolving shutters.
261. B. A. Bromwich, Charterhouse-square—An improved mode of obtaining and applying motive power.

Dated 29th January, 1863.
263. T. A. Weston, Birmingham—A new or improved coupling and break for transmitting or regulating or arresting motion.
264. J. B. E. Louit, sen., Bordeaux—Imp. in glasses termed chimneys, used for gas or other lights.
267. J. Pouncy, Dorchester—Imp. in obtaining, transferring, and printing from photographic pictures or images, also in preparing materials for the same.
269. J. Nadal, Brookes Market, Brook-street, Holborn—Imp. in fountains.
271. C. H. G. Williams, Rumford-street, Glasgow—Imp. in the manfacture of red colouring matters.
273. G. Blake, Trowbridge, Wiltshire—Imp. in apparatus for heating and warming.
275. J. Sainty, Burnham, Norfolk—Imp. in feeding troughs for sheep and other cattle.

Dated 30th January, 1863.
279. W. E. Gedge, 11, Wellington-street, Strand—Imp. in cones or forms for moulding refined sugar. (A com.)

281. N. P. C. Lloyd, 1, Liverpool-street—An improved atmospheric engine, applicable to purposes to which steam, horse, wind, and water power is applied.

Dated 31st January, 1863.

287. J. Grossmith, 85, Newgate-street—An improved mode of producing the aura electric gas.
289. W. Drummond, Bank of England—Imp. in apparatus for stopping the supply of gas to burners when the light is put out.
290. W. A. Lyttle, Andover lodge, Albion-road, Hammersmith—Imp. connected with cigars and other tobacco smoking appliances.
291. E B. Wilson, Parliament-street, Westminster—Imp. in supplying air, gases, steam, or fluids to iron and other furnaces, and to engines and vessels requiring such supply, and in the apparatus employed therein.

Dated 2nd February, 1863.

293. E. H. Massey, 15, Pine-grove, Crown-street, Liverpool—Improved preparation or compositions for coating and colouring the walls, ceilings, and other parts of buildings.
295. A. Forbes, Canal-terrace, Aberdeen—Imp. in means or apparatus for soldering together parts of vessels formed of tin or tinned plate.
297. R. H. Frith, Leinster-road, Rathmines, Dublin—Imp. in the manufacture of paper.
299. W. Clark, Qudrant-road, Highbury New-park—Imp. in armour plated and other ships.

Dated 3rd February, 1863.

301. T. Raworth, Leicester—Imp. in looms for weaving ribbons, elastic webbing, and other narrow fabrics.
303. S. Oddy and E. Oldfield, Adelphi Iron Works, Salford—Certain imp. in carding engines.
305. A. T. Blakely, Parliament-street, Westminster, and J. Vavasseur, Southwark—Imp. in projectiles for ordnance.
307. W. G. Valentin, Oxford-street, and F. Levick, Blaina, Monmouthshire—Imp. in generating combustible gases, and in the apparatus employed therefor.

Dated 4th February, 1863.

309. G. Harton, North road, Highgate—Imp. in wood paving.
311. T. E. Tallent, New Church-street, Bermondsey—Imp. in the manufacture of leather, and in machinery for that purpose.
313. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in the mode of uniting metallic surfaces. (A com.)
315. J. J. Hays, Hitchin—An improved hot air stove where peat charcoal is the fuel employed, and for the method of using peat charcoal or other suitable fuel in connection with the said stove or other stoves for the purpose of purifying or filter ing the gaseous products of combustion.
316. L. J. H. Marville, 2, Rue St. Appoline, Paris—A new kind of covering for the ears, made of india-rubber, gutta percha, or other materials.
317. Z. M. Parkes, 2, Upper Park-place, Plumstead-common—An imp. in iron and other metal bond for use in building.
319. B. Russ, Bristol—Imp. in the construction of iron ships or vessels, and of armour applicable thereto.
321. J. A. Manning, Inner Temple—Imp. in the treatment of night soil and other waste products, and for the manufacture of manure therefrom.
322. W. Stokes, Edgbaston, Birmingham—Imp. in the construction of window sashes, whereby the same are rendered more weather proof and secure against draughts and burglars, and permit the outside to be cleaned with the facility of the inside.

Dated 5th February, 1863.

323. W. T. Mabley, Altrincham, Cheshire, and W. T. Cheetham, Ashton-under-Lyne—Imp. in blowing organs and other such musical instruments, parts of which imp. are also applicable to obtaining motive power for other purposes.
325. W. Betts, Wharf-road, City-road—Imp. in apparatus for applying metallic capsules to bottles.
327. E. Ingham, Halifax and Bradford—An improved apparatus for and means of dyeing wool in the sliver, from which "mixture yarns" may be drawn.
328. R. A. Brooman, 166, Fleet-street—Imp. in machinery for supplying and spreading wool and other filamentous materials on belts, tables, and other surfaces, to be afterwards carded and otherwise acted on. (A com.)
329. J. Paterson, Staining-lane—Imp. in buckle and hook fastenings.
330. R. A. Brooman, 166, Fleet-street—Imp. in apparatuses for tuning pianofortes. (A com.)

Dated 6th February, 1863.

331. B. F. Bates, Morley's Hotel, Strand—Imp. in cannon and in projectiles to be used therewith. (Partly a com.)
333. T. Blakeley and B. Meakes, 11, Bread-street-hill, Cannon-street—An improved lead and stone pencil sharpener.
335. G. Stevens, Victoria terrace, Camberwell—Imp. in means or apparatus for effecting a regular supply of air or aeriform fluids for various purposes.
337. R. A. Brooman, 166, Fleet-street—Imp. in carding engines, whereby slivers are formed into threads ready for spinning. (A com.)
339. J. Price, 84, High-street, Southampton—Imp. in signal lanterns suitable for being used in open boats.
341. A. Ellissen, Warwick-road, Maida vale—An improved method of treating sheeting and plates of iron to be used in ship-building and marine constructions for protection against marine animals and marine plants.

Dated 7th February, 1863.

343. J. Sirou, Castel Sarrazin, France—A new medical preparation for internal and external application.
345. G. Turner, 13, Rose-terrace, Brompton—Imp. in means or apparatus for mincing or cutting meat or other substances.
349. J. James, 12 and 13, Red Cross-square, Cripplegate—An improved covering for hooped skirts.
351. M. Hackforth, Bentinck-street, Manchester-square—Imp. in shades or reflectors for lighting purposes.
353. D. Groucutt, Coseley, Staffordshire—An imp. or imps. in the manufacture of iron for making nails.

Dated 9th February, 1863.

357. D. Law and J. Downie, Glasgow—Imp. in traction engines or common road locomotives.
359. H. Smith and J. Smith, Bury St. Edmunds—Imp. in drills or machines for depositing seed and manure.

Dated 10th February, 1863.

361. J. Crosby, Audenshaw, and J. B. Smith, Bury, Lancashire—Imp. in carding engines for carding and drawing flax tow, in part applicable to carding cotton or other fibrous substances.
363. R. Burley, Glasgow—Imp. in handles for hammers, mallets, picks, mattocks, and similar tools.
365. M. Cartwright, Hoxton—Imp. in combining plastic substances with metals.
367. W. Whitaker and W. Tongue, Bradford—Imp. in apparatus and processes for steeping, boiling, washing, bleaching, and dyeing fibrous materials or slivers, slubbings, rovings, yarns, or woven fabrics of the same.

Dated 11th February, 1863.

371. J. Duckworth, Pilkington, near Manchester—Imp. in the manufacture of paper.
375. W. Symington, Glasgow—Imp. in weaving and in apparatus therefor.
377. E. Humphrys, Deptford, Kent—Imp. in apparatus for steering ships.

Invention with Complete Specification Filed.

414. M. Ohren, Sydenham—Imp. in the construction of gas holders, and in the mode of rendering gas holders self-acting.—16th February, 1863.

Patents Sealed.

[*From Gazette, February 20th*, 1863.]

February 20th.

2362. H. P. Hughes.
2364. J. Harrison & B. Harrison.
2370. A. Crichton.
2374. R. Sims.
2384. J. J. Potter.
2389. J. J. Moeckel.
2400. G. W. Dyson.
2402. P. W. Mackenzie and S. W. Smith.
2406. E. T. Hughes.
2407. E. C. Harding and C. Doody.
2414. J. Walker.
2428. R. Glanville.
2468. C. W. Williams.
2537. J. Whines.
2580. H. R. Fanshawe.
2910. A. Krupp.

[*From Gazette, February 24th*, 1863.]

February 24th.

2379. R. A. Brooman.
2381. J. G. Nutting.
2390. E. Lachenal.
2391. W. Husband.
2401. W. Owen.
2408. F. LeConte.
2411. J. Meyer.
2416. J. Ellis.
2417. J. Whitehead.
2418. E. G. Fitton.
2419. J. Watt and T. S. Haviside.
2447. J. Platt & W. Richardson.
2449. R. P. Coles.
2471. J. Whitehead.
2522. H. J. Lewis.
2529. E. G. Chant.
2637. J. Brown.
2650. W. Carrick & W. Carrick, jun.
2702. C. Chinnock.
2775. J. H. Johnson.
2836. G. T. Bousfield.
3934. A. Guild.
2979. J. H. Johnson.
3002. T. Brown.
3052. A. Graemiger.
3061. E. S. Ritchie.
3100. N. Thompson.
3203. T. Evans.
3209. J. Anderson.
228. W. E. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, February 24th*, 1863.]

February 16th.

435. A. Belpaire.
440. H. D. P. Cunningham.

February 17th.

508. J. H. Johnson.
587. J. Eccles.

February 18th.

475. C. Schiele.
723. J. Aspell, E. Booth, and J. Hurst.
755. C. Ashworth.

February 19th.

465. Sir C. T. Bright.
485. P. A. J. Dujardin.
527. T. Silver and J. Hamilton.
564. R. H. Collyer.

February 20th.

522. G. Jenkins.
562. W. E. Newton.
605. J. Howard.
624. A. Paget.
664. W. E. Newton.

February 21st.

494. J. Pegg.
499. E. Mucklow.
593. W. H. Muntz.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, February 24th*, 1863.]

February 17th.

452. J. S. C. Heywood and G. Lloyd.

February 18th.

420. W. G. Merrett.
460. E. Schischkar.

February 19th.

431. J. Freer.

February 20th.

470. H. Loveridge.
505. T. T. Jopling.

Journal of the Society of Arts.

FRIDAY, MARCH 6, 1863.

COMMITTEES OF REFERENCE.

Replies to the circular letter of the 30th January, issued to the members and published in the *Journal* of the 6th February, having been received, the Council have appointed Committees under the several heads therein referred to.

The Committee on Fine Art met on Tuesday last, Sir Thomas Phillips, Chairman of the Council, in the chair. The Chairman having invited the Committee to suggest any subjects connected with Fine Art, in which they were of opinion that investigation could be usefully made through the agency of the Society, it was resolved to recommend the subjects of Frescoes, Mosaics and Glass-Painting, and Pigments, as matters to which the attention of the Society might be advantageously directed.

The Committee were further asked to assist in the preparation of the new list of premiums about to be issued by the Society, by recommending any subjects bearing upon the Fine Arts for which premiums might be offered; and it was arranged that a circular for this special object be sent to each member of the Committee.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary*.

The subscription of each member is limited to one guinea.

The following is the list of subscribers up to the 5th inst.:—

Adams, Thomas	£1	1	0
Adams, George G.	1	1	0
Adams, George William	1	1	0
Addington, Right Hon. Henry Unwin	1	1	0
Adley, Charles Coles	1	1	0
Akroyd, Edward	1	1	0
Alger, John	1	1	0
Ames, John	1	1	0
Anderton, James	1	1	0
Andrew, W. P.	1	1	0
Artingstall, George	1	1	0
Atkinson, William	1	1	0
Austin, James	1	1	0
Avery, Thomas Charles	1	1	0
Bacon, Jacob Perkins	1	1	0
Bagnall, Charles	1	1	0
Balleras, Guillermo Esteban	1	1	0
Barber, Charles	1	1	0
Barry, Dykes	1	1	0
Bartlett, William E.	1	1	0
Beckwith, Edward Lonsdale	1	1	0
Belcher, Rear-Admiral Sir Edward	1	1	0
Bentley, Robert J.	1	0	0
Best, Hon. and Rev. Samuel, M.A.	1	1	0
Birkett, John	1	1	0
Bischoff, James	1	1	0
Blagden, George	1	1	0
Blaine, Delabere Roberton	1	1	0
Bodkin, William Henry	1	1	0
Boileau, Sir John P., Bart., F.R.S	1	1	0
Bosanquet, George Jacob	1	1	0
Bowley, Robert K.	1	1	0
Boyd, James	1	1	0
Braby, Frederick	1	1	0
Brassey, Thomas	1	1	0
Breillat, E.	1	1	0
Brett, John W.	1	1	0
Brickwood, John Strettell	1	1	0
Bright, Sir Charles	1	1	0
Broad, Robert	1	1	0
Brook, Charles	1	1	0
Brooke, Charles, F.R.S.	1	1	0
Brookes, William	1	1	0
Brooks, Henry	1	1	0
Browell, Edward M.	1	1	0
Brown, Henry	1	1	0
Brown, Sir William, Bart.	1	1	0
Browne, Edward	1	1	0
Budgett, John P.	1	1	0
Burgoyne, Gen. Sir John F., Bart., G.C.B., F.R.S.	1	1	0
Burton, William S.	1	1	0
Cama, M. H.	1	1	0
Candy, Charles	1	1	0
Caplin, Madame R. A.	1	1	0
Champion, Percival	1	1	0
Chance, Robert Lucas	1	1	0
Charlton, Henry	1	1	0
Chater Joseph	1	1	0
Christie, Robert Monro	1	1	0
Clabon, John M.	1	1	0
Clutton, John	1	1	0
Cock, John, Junr.	1	1	0
Coghlan, H. T.	1	1	0
Cole, Henry, C.B.	1	1	0
Cope, Walter	1	1	0
Corbett, John	1	1	0
Corderry, Edward	1	1	0
Cosens, Frederick W.	1	1	0
Coulson, William	1	1	0
Courtauld, Samuel	1	1	0
Creed, Henry	1	1	0
Critchett, Charles (Assistant Secretary)	1	1	0
Cubitt, William	1	1	0
Cullingford, W. H.	1	1	0
Curling, Joseph	1	1	0
Crawford, Robert Wygram, M.P.	1	1	0
Darby, Abraham	1	1	0
Davenport, Samuel Thomas (Financial Officer)	1	1	0
Davidson, Thomas	1	1	0
Dawbarn, George	1	1	0
Dawbarn, Richard W.	1	1	0
Dawbarn, Robert	1	1	0

Day, William	1	1	0
Debary, Peter Francis	1	1	0
Dickson, Peter, F.R.G.S.	1	0	0
Dilke, Sir C. Wentworth, Bart.	1	1	0
Dilke, Charles W.	1	1	0
Dixon, Thomas	1	1	0
Docker, F. W.	1	1	0
Dowleans, A. M.	1	1	0
Drax, J. S. W. S. Erle, M.P.	1	1	0
Dunn, Thomas	1	1	0
Dutton, William C.	1	1	0
Eamonson, Joshua J.	1	1	0
Eastham, John	1	1	0
Easton, James	1	1	0
Easton, Percy Shand	1	1	0
Ebury, Lord	1	1	0
Elliot, William Henry Fletcher	1	0	0
Ellis, William	1	1	0
Evans, E. Bickerton	1	1	0
Evans, Jeremiah	1	1	0
Ewart, William M.P.	1	1	0
Faraday, Michael, D.C.L., F.R.S.	1	1	0
Faulkner, John, Junr.	1	1	0
Fauntleroy, Robert Thomas	1	1	0
Field, John	1	1	0
Field, William	1	1	0
Foley, Lord	1	1	0
Fordham, Thomas	1	1	0
Foster, P. Le Neve (Secretary)	1	1	0
Fox, Sir Charles	1	1	0
Fowler, Robert N.	1	1	0
Freer, Rev. Richard Lane, D.D.	1	1	0
Fussell, Alexander	1	1	0
Garling, Henry	1	1	0
Geeves, William	1	1	0
Gilbart, James William, F.R.S.	1	1	0
Goding, Charles	1	1	0
Godwin, George, F.R.S.	1	1	0
Gonzaga, H. S. H. the Prince Alexander of, and Duke of Mantua	1	1	0
Gooch, Joseph H.	1	1	0
Gooch, Thomas	1	1	0
Goode, Thomas	1	1	0
Gordon, Col. W. J., C.B., R.E., D.A.G.	1	1	0
Gould, Charles Augustus	1	1	0
Graham, Peter	1	1	0
Graham, Thomas, D.C.L., F.R.S.	1	1	0
Graham, William	1	1	0
Grant, Alexander	1	1	0
Grey, Major-General the Hon. Charles	1	1	0
Grove, W. R., Q.C., F.R.S.	1	1	0
Gruneisen, Charles Lewis	1	1	0
Hack, Thomas	0	10	6
Haden, F. Seymour, F.R.C.S.	1	1	0
Hall, Walter	1	1	0
Hamilton, Edward	1	1	0
Hammond, William Parker	1	1	0
Hancock, James Lyne	1	1	0
Hancock, Frederick William	1	1	0
Hanhart, Michael	1	1	0
Hannay, John	0	10	6
Hannay, Robert	1	1	0
Hannay, Robert, Jun.	0	10	6
Hannay, Thomas	0	10	6
Hannington, C. S.	1	1	0
Harrison, Henry	1	1	0
Harrison, Thomas E., C.E.	1	1	0
Hawes, William	1	1	0
Hayward, T. Carlyle, Jun.	0	10	6
Headland, Edward	1	1	0
Heane, Henry	1	1	0
Heather, James	1	1	0

Heymann, Lewis	1	1	0
Heywood, James	1	1	0
Hick, John	1	1	0
Hicks, Thomas	1	1	0
Hollins, Michael Daintree	1	1	0
Holmes, Alfred William	1	1	0
Holmes, Herbert Mountford	1	1	0
Holmes, James	1	1	0
Horton, Isaac	1	1	0
Horton, John	1	1	0
James, Jabez	1	1	0
Joel, Joseph	1	1	0
Johnson, Henry	1	1	0
Johnson, Jabez	1	1	0
Jones, James W.	1	1	0
Jones, Owen	1	1	0
Jones, Richard Lambert	1	1	0
Kelk, John	1	1	0
Kemp, George T.	1	1	0
Khaznadar, S. E. le Général Moustapha, Premier Ministre de S.M. Tunisienne	1	1	0
Lambert, Thomas	1	1	0
Lawrence, Frederick	1	1	0
Larnach, Donald	1	1	0
Le Couteur, Col. John, F.R.S.	1	1	0
Leeks, Edward Frederick	1	1	0
Leighton, John, F.S.A.	1	1	0
Levi, Leone	1	1	0
Lewis, Stephen W.	1	1	0
Longstaff, G. Dixon, M.D.	1	1	0
Lucas, Thomas	1	1	0
Macarthur, Major-Gen. Sir Edward, K.C.B.	1	1	0
MacDonald, J. C.	1	1	0
Macfarlane, Walter	1	1	0
Maclea, Charles G.	1	1	0
Malcolm, Major-Gen. G. A.	1	1	0
Manby, Charles, F.R.S.	1	1	0
Marryatt, Joseph	1	1	0
Marsh, Matthew Henry, M.P.	1	1	0
Martin, John	1	1	0
Martin, Thomas	1	1	0
Martineau, David	1	1	0
Matthew, James	1	1	0
May, Harry	1	1	0
McMurray, William	1	1	0
Mechi, Alderman	1	1	0
Merle, William Henry	1	1	0
Middleton, David	1	1	0
Miles, Alfred W.	1	1	0
Mocatta, Benjamin	1	1	0
Moore, Charles	0	10	6
Morant, Robert	1	1	0
Moulton, Stephen	1	1	0
Muir, William	0	10	6
Mulready, William, R.A.	1	1	0
Munn, Major W. A.	1	1	0
Murchison, J. H.	1	1	0
Murchison, Sir Roderick Impey, D.C.L.	1	1	0
Napier, Robert	1	1	0
Navroji, Dádábhái	1	1	0
Newcombe, S. Prout	1	1	0
Noble, Matthew	1	1	0
Oldershaw, Capt.	1	1	0
Pagden, Stephen	0	10	6
Pakington, Sir John S., Bart., M.P.	1	1	0
Palmer, George	1	1	0
Paul, J. Michell	1	1	0
Pearce, Alfred B.	1	1	0
Penn, John	1	1	0

Petrie, Samuel	1	1	0
Pierce, William	1	1	0
Phelps, Charles	1	1	0
Phillips, Sir Thomas, F.G.S.	1	1	0
Potter, Thomas	1	1	0
Preller, C. A.	1	1	0
Price, Arthur J.	1	1	0
Proctor, John	1	1	0
Provis, William Alexander	1	1	0
Pryor, William S.	1	1	0
Quain, Richard, M.D.	1	1	0
Radstock, Lord	1	1	0
Ratcliff, Charles	1	1	0
Rawson, W. H. Jun.	1	1	0
Redgrave, Samuel	1	1	0
Reeve, Charles	1	1	0
Reeves, John Russell, F.R.S.	1	1	0
Reid, Lestock Robert	1	1	0
Reiss, James	1	1	0
Reveley, Henry W	0	10	6
Rivett, Joseph Cedric	1	1	0
Rixon, Alfred H.	1	1	0
Robb, Alexander	1	1	0
Routledge, Thomas	1	1	0
Russell, Capt. G.	0	10	0
Russell, John James	1	1	0
Russell, John Scott, F.R.S.	1	1	0
St. David's, Bishop of	1	1	0
Salomons, Aaron	1	1	0
Salomons, David	1	1	0
Salt, Titus	1	1	0
Sargood, F. J.	1	1	0
Saul, G. T.	1	1	0
Schneider, Richard	1	1	0
Sedgwick, John Bell	1	1	0
Shearer, Bettesworth Pitt	1	1	0
Sheriff, G. W.	1	1	0
Shove, W. Spencer	1	1	0
Sibthorp, Henry, A. M. W.	1	1	0
Sich, Henry	1	1	0
Silverlock, H.	1	1	0
Simon, George	1	1	0
Smart, Sir George T.	1	1	0
Smith, George	1	1	0
Smith, George	1	1	0
Smith, J. Scott	1	1	0
Smith, R. M.	1	1	0
Smith, T. Mosdell	1	1	0
Sopwith, Thomas, F.R.S.	1	1	0
Spicer, Henry	1	1	0
Spicer, William Revel	1	1	0
Stanton, George	1	1	0
Stephens, Charles	1	1	0
Stirling, Thomas	1	1	0
Straker, John	1	1	0
Styles, Thomas	1	1	0
Sugden, Samuel	1	1	0
Sulivan, Right Hon. Lawrence	1	1	0
Symonds, Capt. R.N.	1	1	0
Sykes, Col. W. H., M.P., F.R.S.	1	1	0
Taylor, George	1	1	0
Taylor, John	1	1	0
Teulon, Seymour	1	1	0
Thomas, John Evan, F.S.A.	1	1	0
Trevelyan, Arthur	1	1	0
Trevelyan, Sir Walter Calverley, Bart.	1	1	0
Tuely, Nathaniel C.	1	1	0
Tulloch, James	1	1	0
Turner, W. Shearman	1	1	0
Twining, Thomas	1	1	0
Underdown, E. M.	1	1	0
Unwin, George	0	10	0
Vandoni, Le Commandeur Comte de	1	1	0
Vane, Rev. John	1	1	0
Varley, Cornelius	0	10	6
Veitch, James	1	1	0
Vieweg, A. J.	1	1	0
Walker, Sir Edward S.	1	1	0
Watkins, Zachariah	1	1	0
Watney, Norman	1	1	0
Watson, Dr. J. Forbes, M.A.	1	1	0
Watson, Thomas	1	1	0
Webb, Charles Locock	1	1	0
Webb, Henry Bellamy	1	1	0
Webb, John	1	1	0
Webber, Henry	1	1	0
Whetham, Charles	1	1	0
Willich, C. M.	1	1	0
Williams, Charles Wye	1	1	0
Williams, Walter	1	1	0
Williams, William	1	1	0
Wilson, G. Ferguson, F.R.S.	1	1	0
Wilson, W. Newton	1	1	0
Winkworth, Thomas	1	1	0
Woodd, Basil Thomas, M.P.	1	1	0
Wood, John	1	1	0
Wood, Vice-Chancellor Sir W. Page	1	1	0
Woodhouse, John Thomas	1	1	0
Woollams, Henry	1	1	0
Woolloton, Charles	1	1	0
Wright Philip	1	1	0
Wyon, Joseph Shepherd	1	1	0
Wyon, Leonard C.	1	1	0
Yeats, John, LL.D., F.R.G.S.	1	1	0

THIRTEENTH ORDINARY MEETING.

Wednesday, March 4, 1863.

The Thirteenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 4th inst., Peter Graham, Esq., Member of Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Allen, J.	81, Stainsby-road, East India-road, E.
Allum, Edwyn	43, Kensington-square, W.
Anderdon, James Hughes.	23, Upper Grosvenor-st., W.
Arber, Edward, A.K.C.	Admiralty Office, W.C.
Baccani, Attilio	1a, Cranley-terrace, Brompton, S.W.
Bailey, John	10, Conduit-street East, Paddington, W.
Banister, John	13, South-st., Finsbury, E.C.
Chadburn, Charles Henry.	71, Lord-street, Liverpool.
Grattann, William Henry.	1, Belmont villas, Kensington, W.
Kerrison, Sir Edward C., Bart., M.P.	140, Piccadilly, W.
Lovegrove, John James.	6, Pembroke-place, Spring-grove, Isleworth, W.

The following Candidates were balloted for and duly elected members of the Society:—

Caddick, Edward	West Bromwich.
Eastham, Silas	7, Market-street, Manchester.
Hartley, John Galley	22, Craven-st., Strand, W.C.
March, Richard Alfred	7, John-street, Adelphi, W.C.

The Paper read was—

ON THE INFLUENCE OF CERTAIN SOCIAL INSTITUTIONS ON THE PROGRESS OF THE FINE ARTS.

By George R. Burnell.

In the course of the last autumn I was staying in Amsterdam, and whilst there I witnessed an exhibition of paintings, which had been collected together by the Club "Arti et Amicitiæ," for the decoration of the principal room of the club, which were illustrative of the history of civilisation in Holland in the various periods of her history. These paintings were all of the "cabinet" class, of the style and manner the Dutch are so well able to appreciate; but they indicated in the minds of the directors or managers of the club an intention which I thought we might do well to copy. They displayed an evident desire on the part of the managers to promote the study of the Fine Arts, as connected with the history of the country; they displayed a manifest wish to connect the social organisation of a club with the history of the future of the Fine Arts; and they showed a keen perception of the relationship which exists between the present and the past state of painting in Holland, and the forms of civilisation therein prevalent. At the same time, the style and manner of the paintings which were produced were so manifestly in accordance with the taste of the times, that they were truly the reflex of that taste itself, and it would have been impossible to have found elsewhere a more intimate personification of the state of Dutch society, with all its grandeur and all its littleness. And I could not refrain from inquiring to what extent the social organisation of the club had, in this case, acted and reacted upon the history of painting in Holland, and to what extent such organisations might, at the present day, serve to compensate for the loss of the great patrons of art, such as existed in former times in the wealthy nobility of the Continent, now so fast disappearing under the influence of that fearful mistake—the Code Napoléon—so prevalent amongst continental nations; and also, by further development of the mode of thought thus excited, how far the social institutions of Holland or of England could be made conducive to the development of the taste for the arts amongst the bulk of the nations exposed to their influence.

Now, it seemed to me that the club referred to had received the impression of the state of the Arts, which I have noticed as being prevalent in Holland, in this respect, that it had ordered a set of small pictures to illustrate the great events of the national history. This tendency was to be explained by the same law which has made the Dutch people a nation who seek their pleasures in their own homes and in their own domestic circle, and who are incapable of finding pleasure in the public display of taste, or of the arts arising from it. There is in this matter a curious analogy running through all the modifications of the national mind of Holland, which is the more remarkable, that the taste of the Flemings, and of the Germans of the Low German race, who live in very nearly the same conditions as the Dutch do, have displayed essentially different qualities from those observable here. Thus, the Flemish school of painting has always been able to boast of its great historical artists, such as Otto Venius, Rubens, Vandyke, Jordaens, and, more recently, Gallait; the Flemish musical school can boast of its Gretry and its Fetis, but in the walks of literary eminence it has no name to cite. The Low German school has produced the distinguished set of painters who have made the reputation of the Dusseldorff school, such as Bendemann, Schadow, Rethell, Vanshon, Hubner, Scheuren, Danneker, &c.; whilst the Cologne school of musicians is celebrated throughout Europe, and the literary glories of the Hanoverian and the Low German race may well challenge comparison with those of any part of the world. But the Dutch have at all times been rather remarkable for the absence of such qualities as are required to enable a nation to be distinguished in the arts which appeal to the imagination. With the exception of Rembrant, Ruysdael, Cuyp, and Berghem, their painters have all been of the earth, earthy; their music is more instrumental than imaginative; their literature has been homely, and rarely has risen to the expression of a sentiment which would appeal to any one but a Dutchman, accustomed to live in the green fields, and the flat, even richness of the alluvial plains. When the Dutch painters have attempted history, it has always been on a small scale, and their pictures have been cabinet ones; just such, in fact, as the pictures of the club "Arti et Amicitiæ," which are good specimens of the Dutch notions of what is required to constitute a representation of the progress of the nation from barbarism to civilisation; but which are utterly unable to find the expression of the thoughts and feelings which shall never die, or which shall enable a nation to speak to the universal soul of future generations.

But if the pictures in the Club "Arti et Amicitiæ" thus bear the stamp of the present generation, and of the feeling which has prevailed in Holland on the subject of the Fine Arts, they bear also distinctly the signs which we should expect from a body which aspires to lead the national taste in art matters. The tendency of all public bodies is, when left to the action of pure motives, thus to seek the glorification of the feelings which are of themselves impersonal, and are connected with the sentiment of the national prosperity; and thus to appeal to the patriotic notions of the whole people, as contradistinguished from those of a peculiar clique. The objects sought to be represented in the pictures under notice are the events connected with the national history; they are utterly without reference to the local history of Amsterdam or to the local wants and modes of thought of its inhabitants; at the same time there is something *small* in the manner in which the artists have represented the scenes they have selected to illustrate the phases of the progress of civilization in Holland—something which indicates the homely but earnest feelings of the Dutch, who, for a hundred years, waged a cruel and bitter warfare against the wealth and power of Spain, and at last triumphed over it by the peace of Munster, so appropriately represented by Vander Helst's glorious picture in the museum of that town. Action and reaction are thus manifest in the works chosen to ornament the walls of the club, and the pictures are, in this respect, correct reflexes of the genius of the people, such as circumstances have made it. The feelings and temper of the age are well represented in the pictures painted by the Dutch artists as illustrating the history of their civilization; and they are conceived from the point of view, and treated in the very style and manner, they might have been expected to be likely to adopt—all the circumstances of the case being taken into account.

The precise influence which the club organization has exercised upon the Dutch life must always be discussed by foreigners with a considerable amount of diffidence, because they cannot be aware of the facts which tend to make such organizations potent for good or for evil, or which may serve to explain the nature of the influence. It seems, however, that at the present day, when large fortunes are rare, and when the transmission of pictures in the same family is becoming more and more difficult on the Continent, that such bodies must exercise a very powerful effect upon art, not only by ordering pictures of a higher character than those which would be ordered by private individuals, but also by retaining those pictures in a quasi-inalienable manner. In Amsterdam, it is true, there are several collections of historical value, of which some, like the collection of M. Six, have been handed down from generation to generation since the days of Rembrandt, Frank Hals, Cuyp, Ruysdael, &c., and others, such

as the collections of M. Fodor and Vander Hoope, have been left to the municipality. But these are all collections which are remarkable for their portraits, and their scenes of common, every-day life, and in no wise are distinguished for the display of the talent for high art. The clubs, then, seem to me destined to raise the standard of national taste, by encouraging the artists to seek the subjects of their pictures in something better than the personification of young women scraping a carrot or plucking a duck, or in submitting to the somewhat indelicate operations of the doctors of other times. The attempt to represent the history of civilization in Holland is, indeed, a great step in advance upon the choice of such subjects, and the club that has ordered for its meeting room a series of pictures illustrating that peculiar phase of the national history cannot but be endeavouring to rouse their countrymen to a sense of higher duties and aims. To what extent it may succeed in the object it seems to have proposed to itself must long remain a problem. National tastes in art are always grounded on some hidden law of nature, and they cannot be eradicated by the decision of even the best men, unless the circumstances which gave rise to that law shall have been altered, and it is precisely in this respect that a foreigner must be at a loss to arrive at any safe conclusion. Still, the mere ordering for the club of the pictures which now adorn its walls, argues that there is a spirit abroad which is very different from the old one; and the encouragement thus given to this new tendency may lead to a more general desire on the part of the Dutch public to witness the treatment of subjects, other than those connected with domestic and with still life. To me, therefore, it seems as though the influence of this club in particular, and of all such institutions, must be for good, especially as the absence of large fortunes is making itself more felt, and there is now no class of individuals who would possess the power and influence to head any new movement in the arts. I still think that the tendency of the Dutch painters is towards the treatment of their subjects on a small scale, and though this club, "Arti et Amicitiæ," has done nothing towards an alteration in this respect, yet the tendency of the action of this body has manifestly been in the right direction, and their influence will be felt at some future day in the art history of their country, when the present generation shall have passed away, and its effects upon society be numbered with the past.

In the very remarkable Report of the "Commission Française sur l'Industrie des Nations," by le Comte Léon de Laborde, that eminent authority, after dwelling upon the influence that the Court of France and the great aristocracy of that country had exercised upon art, came to the conclusion that, hereafter, the influence of those bodies must be compensated for by an attempt to popularize the objects of the pursuits of artists, and that the patronage of the higher branches of design must be transferred to the multitude at the present day, taking care in the meantime to educate that multitude, so that it should be able to appreciate the objects submitted for its approval. Leigh Hunt some time since promulgated the same theory, when he cried, "Hang up a picture in your room," and if the taste displayed in the selection of those pictures be good, there can be no reason for questioning the propriety of the recommendation. But it seems that the Comte de Laborde and Leigh Hunt both reckoned without their host, and that the pictures which are selected by the public are of a very inferior class; that the popularizing of the arts has at present simply resulted in lowering their tone, and that the productions of artists, able and worthy to lead the opinions of their nation, are abandoned for those of the men who paint, carve, or design in a style to please the mob of small purchasers. The Art Unions in our country have done much to develope the false taste which leads the public to prefer the enjoyment of its own individual fancies to the true interests of art, by encouraging the habit of "hanging a picture up in your room," instead of contenting themselves with the reproduction of some noble work by the cheaper methods of engraving and modelling; and they have been very far indeed from having diffused the love for the higher branches of the art, such as would have been cultivated in other times and by other men. It may be that the patronage of the public is superior to that of a class, and that it is better to address a large body than a small clique; but this supposes that the large body is an educated one, and capable of forming opinions on the subjects submitted to it, a condition, alas! which has not yet been attained in matters connected with art education either here or abroad. So that, for the present, the patronage of art must be left for the class (which is, in fact, the class of the Club "Arti et Amicitiæ,") which possesses the education and the means of appreciating and rewarding the talents that may display themselves even in works of art that may not for the time be popular, but are essential to the well being of those arts when properly understood.

It must not be understood that, in saying that the members of this club are to be praised for the patronage of art they have already displayed, their conduct in this respect is held up to general admiration, or is recommended for universal adoption. Far from it. The taste displayed in the design of the building wherein they meet is very equivocal; it is a cemented building, without any meaning, but with a great deal of pretence, and its internal arrangements are about as bad as can be conceived. It is a sad peculiarity of the Dutch that there is hardly such a person amongst them as a pure architect, and the bulk of their constructions are erected by mere builders, who possess, like all their fellows, the rudiments of their art. The consequence is that Dutch buildings are all devoid of feeling and of artistic arrangement, especially in their staircases (which are all like ship's ladders) and their window openings (which are never proportioned to the rooms they have to light). The Club "Arti et Amicitiæ" was more fortunate in meeting with a professional architect than its neighbours, but he was not able to rise above the prejudices of his time; certainly he has not succeeded in erecting a monument comparable to the Reform, the Travellers, the Oxford and Cambridge Clubs, or any of the minor clubs which adorn the metropolis of England. Dutch architecture is, in fact, in the very lowest imaginable state, and the managers of this club have not had the courage to break through the traditions of their country by employing foreign architects to design their place of meeting, or, at any rate, to give them the first ideas of the building required for their purposes. The Dutch Government has lately been guilty of the same kind of blunder in the selection of the design for the High Court and the Ministry of the Colonies, at the Hague; but this club might, and ought to, have done better than the government of the country, which always has the monopoly of the bad taste of the professional men it employs. They might have done better than the government; as it is, they have simply repeated the errors of the state architects in a private building.

Now, with regard to the influence which the social organization of clubs might be expected to exercise in England and in Holland, it seems to me that the organization of clubs is fraught with consequences of the greatest importance to the arts in both those countries; and that their future prospects, in fact, depend upon the way in which the directors of such institutions comprehend their duties to society and to their constituents. Without entering into the discussion which has taken place in Paris between M. Halévy, the secretary of the Académie des Beaux Arts, and Comte Léon de Laborde, with respect to the necessity for the vulgarisation of art, in order to develope those applications of it which should give it a character of public utility, it must, we think, be admitted that every institution that contributes in any way to diffuse the taste for the pleasures of the imagination amongst the public at large, must do good.

But the action of these clubs is not limited to the mere vulgarisation of the arts; they are, when well directed, destined to preserve the traditions and tendencies of the higher school of painters and sculptors, who were wont to be patronised by the nobility and gentry of the country; they retain the habits and feelings of these, the more refined classes of the society, of whom they have inherited the traditions and the feelings; and they even elevate those tastes by rendering them the expression of the best educated amongst their number. There is great truth in M. Halévy's criticism, that art is essentially an object of refined taste, and that it avoids the noise, the glare, and the glitter attached to a vulgarisation, using the word in the sense of the rendering popular its processes. "The extreme diffusion of art, this vulgarisation, would, indeed," to quote M. Halévy's words, "lead to results inevitable, infallible—the absorption of art by industry. Attached to industry according to the wants of the moment, exposed to the caprices of fashion, bending itself to the applications which would ensue from its character of public usefulness, art would soon cease to exist as art. It would perish, stifled in the contest. No! art is not that god who is offered now-a-days to our admiration; form is not the ultimate object of his worship; it is not the hot air of the workshop that he must breathe, and the bazaar is not his temple; he requires the calm, the silence, the pure air of solitude; art is poetry-creating, inspired, touching, and gracious." "Thus understood, art would lose in power what it might gain in extent. To apply it in this manner to the vulgar habits of life, is not to practise the worship of art, it is to retain the superstition of it"—and it is precisely because the patronage of art by this class of institutions would remove it from the influence of the common people, that we think they are destined to effect a great good. The intellect of a corporate body is, moreover, more likely to arrive at true conclusions as to the methods of advancing a pursuit which must, after all, depend upon its addressing itself to the tastes and habits of the times for its success; and it is worthy of remark that in Italy, in the best periods, the arts were the most cultivated at the time when corporate bodies were the most powerful, though in other countries the nobility took the place of these bodies. There is something in working for a community which inspires the artist with a confidence in the choice of his subject, and in his manner of treating it, which is wanting in the productions of his pencil, or chisel; and the very vulgarisation M. de Laborde calls for seems to me really to be attained by the exchange of masters thus brought about—the exchange from the patronage of the capricious few to that of the enlightened many, as it is supposed the majority of the members of these institutions generally are, or as they certainly ought to be.

It may be asked how these institutions, these clubs in fact, can be made to render greater service than they do at present; or how they could more effectually patronise the arts than they now do? The answer to this is a reference to what the Club "Arti et Amicitiæ" has effected in Holland, with the small means it has at its disposal, and to the encouragement it has afforded to the Dutch artists of the present day to throw off the traditions of their ancient school. Surely the English clubs might "go and do likewise." The subjects of our history connected with the Reform, the Conservative, the Oxford and Cambridge, the Guards, White's, the United Service Clubs, would furnish the elements of many a picture, many a statue, which might ensure the immortality of the club, equally with that of the artist, and which would be of the greatest interest to countless spectators. I speak of *countless* spectators, for I do not understand the productions of the pencil or the chisel being hidden from the public gaze; and, in this sense, I am an advocate for the vulgarisation of art. The painter or the sculptor, like the poet or the musician, gains by addressing himself to a large audience, and the essence of their respective pursuits lies in its power of appealing to the multitude, provided that multitude be educated to form judgments on works of the imagination. It is essential to the development of art that the great encouragers of it should exhibit the master-pieces they may collect, as it is for them to purchase those works; and the Club "Arti et Amicitiæ" have hit upon a good way of effecting this object, by exposing their pictures at certain seasons of the year at a moderate price. The expense of the exhibition is thus defrayed; the public feels that it has not contracted an eleemosynary obligation; and it thus freely discusses the merits of the pictures submitted to its notice. How long the subjects selected for the entertainment of the public may thus continue to excite their interest, must be a matter of careful appreciation on the part of the men who order the works of art that are thus exhibited; but if there be any truth in the opinion that "a thing of beauty is a joy for ever," there can be little reason to doubt that the future generation of sight-seers will find as much interest in the works of the best geniuses of this age, as they have done in those of the preceding times. Surely our means of interpreting the hidden springs of human action are as perfect as those of past generations; our mode of interpreting their wants, their faith, must be as good as that of our ancestors; and even if, when the first newness of the pictures exhibited at the Club "Arti et Amicitiæ" shall have worn away, there should occur a lull in the interest with which they are regarded, we may be certain of this, that directly time shall have hallowed the claim of the present generation to fame, the pictures it has produced will be visited and paid for willingly.

The great question for us Englishmen in all these matters is, however, how are we to make our organisation of society conducive to the diffusion of taste in art, for with the rivalry that is now raging on all sides in these matters, it is necessary that we should "be up and doing" if we would retain our high position in the various works of that branch of intellectual gratification. England has only very lately asserted her claim to a distinguished rank amongst the artists of Europe, and even now her painters cannot claim merit on the score of their historical pictures or their great productions, for the efforts of her painters, when they have risen from the limits of the cabinet picture, have been very unsuccessful, utterly unworthy, for instance, of comparison with those of the French, Belgian, and German schools. It seems to me that the system of clubs, which is so marked a tendency of our age, is the one which especially lends itself to the object thus proposed, and that the execution for them of a series of pictures, illustrative of the history and antiquity of our race, would be one of the first methods of removing from our school the reproach of not directing its efforts to the cultivation of historical painting. The notions connected with this class of pictures are, moreover, of the very character to be popular amongst the members of the clubs, at least, of those amongst them who profess to have ideas beyond the mere eating and drinking which form so distinctive a characteristic of the English institution. It might be said that the same arguments which would apply to the clubs would apply equally to the City Companies, and that the latter have equally the destinies of the Fine Arts in their hands with their West end contemporaries; and it would be true, too, to a certain extent, as was proved by the action of the Corporation of London about the time of Nollekens, Northcote, Opie, &c. But the City seems to have abandoned all care for objects beyond cookery of late years; and it must be confessed that, in spite of the Smoke Nuisance Removal Bill, the atmosphere of the centre of London is very unfavourable for the preservation of works of art, and that the Council Chamber of Guildhall is, as it were, the tomb of the pictures there exhibited. Yet the corporate bodies of the metropolis might do more than they do to encourage art, and they might from time to time give an order for some picture illustrative of the history and the achievements of the bodies they represent, which would be connected with some of

the scenes of our national history, quite as much as the scenes which I would propose to the clubs would illustrate their progress. The strange love for antiquity which pervades our race has preserved these city institutions long after the necessity for their existence had passed away, and the old bodies had ceased to represent any vital interests in our modern society. The continuance of these companies cannot, however, I hold, be maintained, unless they perform some functions for the benefit of the inhabitants of the metropolis; and it would be hard to say how they might discharge their duty in a more satisfactory manner than in the encouragement of fine art. I say this advisedly; because I think the encouragement of this phase of art is the one most adapted to diffuse, amongst the labouring classes, the taste for the purer forms and the best colours, in their branches of trade, and so to assist in what De Laborde calls the vulgarisation of art, or Halévy would hail as the cultivation of the ideal. Both the City companies and the clubs have the interests of fine arts in their keeping just now, and they must be held responsible for the future prospects and success of those arts in England to a very great extent; less so, no doubt, than on the continent, where every kind of corporate body has a distinct duty of this kind to perform, owing to the absence of anything like a territorial aristocracy, which should give the tone and tendency to the manners and customs of the times.

In all these remarks, the influence of the Church, as a body corporate, has been left out of the question, because neither in England nor in Holland has it of late years exercised any guiding power on the progress of those countries in the matter of art. There is something which is unfavourable to the development of the imagination in the Calvinistic and the Lutheran doctrines—a dry, hard, common-place method of viewing all objects connected with the supernatural, which may be in accordance with strict reason, but which is sorely opposed to the exhibition of faith in the objects represented. The look of rapt adoration with which Raphael clothed his figures, the air of mixed love and awe with which he painted the "Virgin Mother of the God-child," the strange faith which characterises Murillo, Titian, and some of the earlier masters of the Italian school, seem to us to be lost; and we can hardly enter into the subdued energy of the expression of Paul Delaroche and of Ary Scheffer. I do not for the present raise the question as to the sincerity of these painters; indeed, from all we know of them, we may suspect very strongly whether Raphael could have deeply felt the purity of the Virgin when he represented her under the features of la Fornarina, or whether Rubens could have been much preoccupied with the sanctity of the subjects he represented when he painted his blowsy Flemish models as the representatives of the saints and angels. Still the fact remains that the Roman Catholic Church has always displayed a much more refined taste in painting and sculpture than the Protestant varieties of faith, and that, as a corporation, it has encouraged art with more intelligence and more success than its rival. I am aware that M. Cocquerel has written a book expressly to prove that the tendency of the Roman Catholic Church has been in Italy to crush the exhibition of the pictorial faculty; but, in my opinion, this tendency was accompanied by so marked an effort of the temporal rulers of that country to establish their power, that the cause of the decay in public taste may be attributed to their action quite as much as to the action of the clergy. In Protestant countries, the greater simplicity of the form of religion must always have opposed the development of the fancy or imagination of the artist, so that the disfavour with which the arts have been regarded may almost of necessity be attributed to the form of worship, to the absence of symbolism, which constitutes the essence of Protestant faith. I would carefully guard myself against anything approaching to an expression of opinion in favour of Roman Catholic doctrines, but I think that the tenets of that Church are far more calculated to lead to the cultivation of the arts of design than those of the churches of England and Holland. It may be that the dogma of the celibacy of the priests has exercised an important effect upon the state of the arts in the respective countries; because the men who cannot transmit the heritage of their fortunes to their children, are most likely to desire to transmit their names to posterity by some works which will arrest its attention. All this discussion is, however, beside our present purpose, which is to discuss the influence certain social organizations might have upon the progress of art in England, and the Church has by common consent long ceased to exercise any kind of guidance or control over it.

The Houses of Parliament, too, and the Government as represented in our legislature, must equally be left out of account, for they are too much exposed to the effects of discussion to allow of their exercising anything like an initiative in these matters. We have seen what the Committee for the Encouragement of the Fine Arts have done, and frankly it must be confessed that it is next to nothing. There is something repugnant to the fancy and imagination of a painter, or a sculptor, to be obliged to submit his designs to a vote, and yet this system must be adopted in the case of legislative intervention in such matters; and, moreover, the class of men who are selected to serve on these committees are not usually such as are able to exercise an individual influence upon the taste of their age. Look at the pictures which are exhibited in the corridors and lobbies of the Houses of Parliament, for instance. They are affected Germanisms in many cases, bad imitations of the style of Paul Delaroche in others: in no case are they characterised by an original feeling, or a national mode of thought, an English style of colouring, grouping, or management. The sculpture is better, it is true; but there is nothing that argues taste and invention in the life-like portraits of the great men erected in St. Stephen's Hall; they are portraits, and nothing more, such as might be seen in Madame Tussaud's exhibition, only without the colour—and they leave the spectator cold and unimpressed, as he walks between them. The Houses of Parliament and the Government, then, have hitherto done nothing to encourage art, and they may be left out of account in the list of social institutions which are likely to advance that end, so important to the interests of the nation.

The Royal Academy might be expected to do something which should be considered advantageous to the interests of the cause under consideration, but there is something anomalous in the organization of that institution which has always interfered with its action in this matter. It may not be worth while at present to examine the constitution of this society, so strangely mingled with the charitable element as it is, and, therefore, so strikingly like the club "Arti et Amicitiæ;" but we may observe that the tendency of its organization is very far from being such as to favour the study of the higher branches of art, or to encourage the development of the taste of the nation in that respect. It is a part of the duties of the academicians to hold exhibitions once a year; these exhibitions are composed of pictures which are all of necessity painted up to "exhibition pitch," and therefore are deficient in the qualities of tone and colour which works of high art might be expected to present, and, worst of all, the exhibitions are open to all who may pay for the privilege, without any claim on their part to form a judgment on the works of art exhibited. The academy, it is true, sends a medallist or so to Italy, to study his art in a congenial atmosphere, and it gives prizes and medals to the various competitors it induces by such means to enter the ranks of artists; it retains schools where young men can, if they like, learn all the elements of their profession; and when an artist has achieved name and position, if he should unfortunately fall upon evil days, it certainly steps forward liberally to relieve his wants, or to soften to him the bitterness of adversity. But this does little for the in-

terest of art, which is of a calmer, quieter nature than to thrive in the glare and bustle of exhibitions; and which, on the contrary, would be more aided by the well-understood exercise of patronage, than it is by the shows which thus annually take place. It seems to me that the Royal Academy has erred in directing so much of its attention to the yearly exhibition, if, as always understood, the object of that institution be to promote the interest of high art. The effect of uniting the pictures is to produce, as was said before, an exhibition pitch of colour, and thus to introduce a false standard of comparison between the works exposed; the tendency of the academic teaching is towards the perpetuation of the tastes, and the principles of the professors which are thus vitiated; whilst the public are deprived of the means of acquiring true taste in the arts (so far as the Academy at least can effect the solution of these questions), by the aristocratic exclusiveness with which the models, and the private collections of the works of the best masters of the English school are shut up from their view. It is true that the purposes of a school might be interfered with by the public exhibition of the works of art thus assembled; but the object of the Academy, so far as it is avowed, is the formation of the public taste, and this object can only be attained by rendering the said public familiar with the best productions of the men who have figured in their generation. This is the more true, because the works of art in the Academy's collection have been painted without reference to the colour or tone of those around them, and, as a rule, when their authors were in the zenith of their powers. I therefore venture to think that in keeping its pictures to itself, the Academy has falsified a portion of the programme which is understood to be that of its institution, and that it has thus become an institution rather for the benefit of poor artists than for the development of taste in the higher branches of art amongst the public in general. The one object ought to have been attended to, the other ought not to have been lost sight of; and until both of them shall enter into the scheme of the Academy, it cannot be considered to number amongst the institutions that are likely materially to influence the future prospects of art in this country, or to aid in the development of public taste in the most ready form that appears to me to be imaginable. I do not know positively whether the last-named object ever entered into the plans of the founders of the Royal Academy, but I believe that they were originally more pre-occupied with the low prices paintings could command in the days of its foundation, than with any general ideas about the patronage of art; and therefore it is that I should be little inclined to seek in the organisation of that body for the means of forming the taste of the nation in this particular walk of the development of the human faculties. There must be a change in the fundamental institutions of the Academy itself before it can in fact be considered as a body destined to modify the public taste of England, and to introduce the feeling for pure art as a source of public gratification and enjoyment.

There remains to be considered the influence which such institutions as this one of the Society of Arts can exercise over the future prospects of those pursuits, and I would fain dwell upon them in some detail were I not afraid of trespassing upon your attention. Founded, as this Society was, for the purpose of Encouraging Arts and Manufactures, and conducted as it was for many years with reference to the former object rather than the latter, it cannot be considered a hardship that the latter object should now principally occupy its attention. The fact is, that in England the arts, as applied to manufactures, have been sadly neglected, and I can understand that an effort should be made to introduce a higher class of design into the productions of industry. Our goods may have been more solidly and more conscientiously made than those of other nations, but they have been sorely deficient in taste, and the Society of Arts has done its duty well in endeavouring to remove this reproach from our nation, by devoting its energies to the improvement of the design of our manufactures, and to the education of the class of men who are entrusted with their execution. But I fear that the attention of the Council has been too exclusively turned in this direction, and that pure art, as pure art, has occupied rather too little of their notice. They seem to have fallen into the error which Comte L. de la Borde has connected himself with, of making the end of public encouragement of art centre itself solely in the habitual reproductions of correct forms in industrial products, and to have left aside the satisfaction of the higher tastes and the nobler aspirations of humanity. All that they have done has been well done; the only reproach that I would make to the Council is, that they have not gone far enough into the encouragement of the pursuits which have no direct practical result, or one which is not susceptible of a money appreciation. Even in the interests of the manufacturing classes, it seems to me that great good would be effected were the patronage of high art to form an element in the composition of the programme of this Society, and that they would gain by the production of a nobler standard of painting and sculpture. The connection between industry and art is very subtle, and the means taken for the encouragement of the one often tells upon the other in a strange way. The experiment has been tried of developing the taste of manufacturers, and of improving their feeling for the application of art to their processes; would it be too much to ask that something should now be done for the production of a feeling for that quality, irrespective of its application, and an appreciation for its productions, through the instrumentality of this Society? The influence of our body is very great, and any course they might adopt with respect to this matter would be sure to meet with numerous imitators. For my own part I should hail with pleasure the adoption of some such course as that cited to have been held by the club "Arti et Amicitiæ" (with all the differences of time, place, and national education), which, I think, might result in the diffusion of a truer taste for the Fine Arts in the bulk of our population, now left without guidance in its aspirations after ideal beauty. Education in this branch is only to be acquired by long study, and the intimate acquaintance with the best models, and the end and object of this Society ought to be to furnish them in a manner easily accessible. The satisfaction of the imaginative faculties is a necessity of our intellectual existence, which must be taken into account by a Society professing to lead in the path of progress, and it is mainly on this score, of the neglect of their cultivation, that I think the recent conduct of the Society of Arts has been rather deficient.

The conduct of the French government in respect to the encouragement of the Fine Arts, might furnish us with a good lesson of what to avoid as well as what to imitate in this matter. The Minister of State, the Minister of the Interior, the Minister of Public Works, all have their separate budgets for the encouragement of the arts, and all of them labour in the cause with the genius for organisation which the French race has always exhibited; but the results obtained are far from satisfactory, and the character of the productions of the French school is more remarkable for its adaptation to the temporary wants or fashions of the day, and to the sentiments it may be in the interest of the government to inspire in the people, than it is to the higher aspirations of the human soul. It is, perhaps, one of the necessities of the governmental patronage of the arts, that it should be connected more immediately with the wants of a practical nature than with the efforts made to attain an ideal perfection, and the French government cannot be blamed for its attempts to spread the taste for artistic excellence, by the encouragement of attempts to introduce it in the ordinary processes of industry. Whatever is effected by the State must have a practical tendency, and the philosophical wants of artists are not sufficiently so to engage the at-

tention of men who deal with the necessities of the passing times. It is the advantage which the freedom from the restraints that governmental action imposes upon our neighbours that constitutes the great advantage of our Society, and would enable it to divert to the encouragement of pure art many of the resources which they must concentrate upon the vulgarisation of that quality. We are in the position, to a great extent, of the Italian governments of the close of the middle ages; and as they could indulge in philosophical disquisitions upon the influence of painting and sculpture, which led to the attainment of the excellence of the Medicean era, so we could, by a judicious exercise of the power and influence we possess, encourage the tendencies towards the development of the nobler faculties of our nature, which are always struggling to find an expression in the mass of the nation. Much has been done by this Society to advance so desirable an end. I conceive that more could still be done by it, and by the club organisation of English life, and that the prosperity of such institutions would be greatly benefited by such a course. Certainly the interests of the arts would be advanced were the governors, or directors of these institutions able to see clearly that their duty, as well as their interest lies in the cultivation of them for their own sakes, and not for the sake of the ameliorations they might obtain in the forms of the objects of industry. Both these institutions, the clubs and such societies as this, have, I conceive, this duty to perform; it must be done carefully, willingly, and, if set about earnestly, it may involve the whole future destinies of civilisation.

DISCUSSION.

Mr. Brett referred to the period of art-history in Holland, when the wealthy merchants of that country not only purchased the works of the great Italian painters, such as Carlo Dolce, Correggio, and others, but also imported productions of art from all parts of the world—cabinets from Japan, table-cloths from Persia and the East, and marbles from Italy. That was a period in which it might be said that a taste for the luxurious in art existed amongst the wealthier classes in Holland, and this gave rise to the Dutch school of painters, which included the names of Rembrandt, Ostade, Hobbema, and other great men; but in more recent times this taste for the higher productions of foreign art appeared to have declined, and in the exhibitions of painting held in Holland within the last few years, they did not find the works of the great Italian masters, showing that such works were not now sought as formerly by the great Dutch collectors, who were more inclined to purchase the works of their own school, and this change of taste had also acted favourably on modern Flemish art. No country whatever had produced pictures so perfectly in accordance with the spirit of the nation as Holland; and it might be truly said that the social history of the people was recorded in the pictures produced by the artists of that country. With reference to the encouragement of art in England, he regretted that the want of taste of George the Fourth had prevented the acquisition of the Orleans Gallery by the nation, a collection which would have furnished valuable opportunities for study to our English painters.

Mr. J. Beavington Atkinson imagined that most present would be inclined to agree with the general conclusions of the author of the paper, but with regard to many of the details he for one most decidedly differed. He thought Mr. Burnell had taken too unfavourable a view of the present state and the recent progress of art in this country. He could in some measure account for that by supposing that Mr. Burnell's studies in Holland had drawn away his attention from what had been done in the meanwhile in England. The subject had been treated under the several heads of church patronage, state patronage, and municipal patronage, and, therefore, he (Mr. Atkinson) should offer no apology for following him in those several departments of inquiry. In the first place, as regarded the church, he was astonished to hear the assertion that, both in Holland and in this country, the church had exercised no influence upon the progress of art, and that in the Protestant faith there was a total absence of symbolism. He need scarcely say that architecture ranked amongst the highest manifestations of Christian art, and that in this country there had been avowedly a marked revival of Gothic architecture. Then again, as regarded sculpture, he would refer to the reredos which were often put into the new churches of this country; and further, as regarded painting, he need only enumerate the frescoes by Dyce, in All Saints' church, Margaret-street, and those by Watts, in St. James-the-Less, Westminster; other churches, which might be enumerated, also contained important mural and fresco decorations. Furthermore he would protest against Mr Burnell's too general conclusion that Protestantism was not capable of art-manifestation. He did not speak of the minor sects of Protestantism, but if they looked to the grander forms of faith in this country and elsewhere, they would find that, when spiritual and enlightened, it had shown itself inherently capable, as he believed it to be, of the highest art manifestation. Therefore he entirely differed from Mr. Burnell in his conclusions as to ecclesiastical art in this country. That gentleman had told them what the State had done, or rather what it had failed to do; that the Commissioners of the Fine Arts had accomplished nothing, and that the men who were selected to serve on that commission were not such as were able to exercise individual influence upon the taste of their age. Now he (Mr. Atkinson) would not mention any of the living members of that commission, but he believed he was correct in saying that both Hallam and Macaulay were among the number; and he knew that many of the leading men in this country were, almost as a matter of course and necessity, chosen to serve on that commission, and if Mr. Burnell had read the published reports of that body, he would have seen that, labouring under great difficulties, they had accomplished much for art in this country. In support of that assertion he need only enumerate a few of the works in the Palace of Westminster. The frescoes "Spirit of Chivalry," by Maclise; "Lear disinheriting Cordelia," by Herbert; "The Meeting of Blucher and Wellington, after the Battle of Waterloo," by Maclise; and a work now in progress by Herbert, "Moses bringing the Tables of the Law." He was given to understand by those capable of forming an opinion, that the last-mentioned work, for accuracy of drawing and dignity of treatment, would still further enhance the status of high art in this country. Therefore, he must say, he did not comprehend the sweeping—the almost unqualified assertion of Mr. Burnell, that the Fine Art Commissioners and the Government of this country had done nothing for art. They might not have done all that could be desired, but they had made a beginning, which had resulted in considerable success. With regard to other public patrons of art—municipal institutions, clubs, &c., it would be well, he thought, to extend their views a little beyond this particular club in Holland. Taking a survey of Europe, they had amongst the Italian mediæval works, Raphael's "Story of Cupid and Psyche" in the Fornarina Palace of Rome; the works of Giulio Romano, at Mantua; and Guido's "Aurora" in the Palazzo Rispoglioso, in Rome. In Germany they had the "Triumph of Maximillian" in the Public Hall of Nuremberg, attributed to Albert Durer. Those were the chief works with which he was acquainted belonging to the middle ages. Coming to modern times, they found analogous decorations, for example frescoes illustrating the History of Germany, in the Public Hall of Dresden; "The Battle of the Huns," "The Destruction of Jerusalem," and other high historic compositions, by Kaulbach, in the New Museum of Berlin; and a historic series in Antwerp, executed by Leys, some of whose

pictures they would recollect were in the late International Exhibition. Thus this club in Holland was by no means an exception. In fact, they had mural decorations, in one form or other, throughout the middle ages down to the present time. Mr. Burnell left them to infer that in this country we knew nothing of like attempts. The very room in which they were assembled was evidence to the contrary. Here they possessed the paintings by Barry, representing the "Progress of Civilisation;" and in the hall of Lincoln's Inn, coming down to present times, they had the noble fresco of "The Legislators of the World," by Watts; and in a hall in Oxford were several pictures by so-called pre-Raphaelite painters. Therefore they had made already in this country a good beginning; and, considering the failures abroad, he did not know that they should be particularly discouraged by any possible failures they had sustained in England, and hence he felt bound to take exception to the too unfavourable view which was taken by Mr. Burnell on the present revival of the arts in this country. They had seen in successive international exhibitions, both in Paris and in London, that the English school of art took a very good, and in many respects a fully equal, position with the other schools of the Continent. In architecture, avowedly, when our architects came into general European competition, they had on several occasions not only obtained the premium for design, but also the execution of the work competed for. He had shown what had already been done by the state, by the church, by individuals, and by collective bodies; and he repeated he saw no reason why in coming years the arts in England should not continue to advance as they had hitherto done, and assume an equal position with the arts on the continent of Europe.

Mr. J. G. Crace remarked that the subject before them was a difficult one to speak upon without due deliberation. If he rightly understood it, it resolved itself into this—Did our social institutions affect the condition of art? Out of which arose the further question—Did that art influence our social system itself? That social institutions must always exercise a strong influence upon art must be patent to all. From the earliest times they knew very well that art had always been particularly influenced by the special institutions of different countries—whether they looked to the earliest ages of Egypt, Greece, and Rome, to the revival of art in Italy, or even to our own times. Now they must all have felt, no doubt, that a state constituted like ours laboured under considerable difficulties with reference to the patronage of art. They knew that where a man had unbounded means, and where he sought to impress his own personal name and influence upon a country, there was no better way of doing it than by availing himself of the powers of art as a means of handing his name and acts down to posterity. They saw that in early times, both in the ancient statuary and more particularly in the earlier efforts of the Italian painters, this spirit had been the prevailing one. It was the favourite saints and the actions of particular religious communities which formed the subjects of the works of the earlier painters. It was the military exploits, the deeds of great conquerors which had exercised their influence upon the paintings of France. For ourselves, we in some degree resembled the Dutch, inasmuch as the domestic relations exercised the greatest influence here. They had noticed what crowds assembled around the painting of Epsom Races some year or so ago. Everybody, however little informed, seemed to take interest in a scene so familiar to him. At the same time, he was bound to say that such a painting as that of the "Finding of Our Lord in the Temple" also attracted its thousands, and was a proof that if the higher style of art were encouraged it would be appreciated. And this brought him to the second question, as to the influence of art on our social system. The Exhibition of Art Treasures at Manchester, four or five years ago, was regarded as a means of awakening the mind of the labouring classes to what good painting really was. As an instance of the ignorance of art amongst such people, he knew of a case of two men sitting down at that exhibition, and one asking the other, "I wonder when they are going to begin." That man's idea of art was that there was some kind of entertainment connected with it. The mere looking at the pictures seemed to afford him no pleasure, and he (Mr. Crace) understood that generally the people looked at them in a sort of wonder as to what they meant, and were unable to understand the events sought to be represented in those pictures. Now, in France, and especially in Italy, in former times, art had an extensive influence upon the people, who, by constantly looking at it, and having it made familiar to them, became able to judge of, and thoroughly to enjoy, what was presented to them. And he might be allowed to say that education in art extended to the million, was not confined to the few, and exercised a most powerful influence, not only on the state of the feelings, and the degree of refinement, which was education in itself, but as leading to great commercial prosperity, or the development of a taste which might be said to be of great value in manufactures. At the present time, when materials were so difficult to be obtained, and where the action of a slight alteration of price upon the raw produce would so influence the value, it was of the utmost importance that taste should be promoted in a country; and nothing could so educate that taste as the making the people familiar with the highest works of art. He acknowledged that in our public institutions there was great lack of this high art. In our public buildings we were sadly deficient, and there was a great deal of truth in what Mr. Burnell had stated. No doubt an effort had been made, but it was a small one, compared even with what had been done in less important countries than this. No one could compare anything that had been done here with the paintings of Kaulbach, in the Museum of Berlin. It was no use being patriotic and at the same time unjust. No doubt a great step had been made, and great disadvantages had been bravely encountered, but there was no doubt that art was not sufficiently encouraged in our churches, our clubs, our public halls, and other places, as was the case abroad.

Mr. Purdie remarked, with reference to the encouragement of fine art by the Government, he did not know of any better way of doing it, either by a government or an institution, than by employing the best men that could be found, and paying them well for what they did. A most useful effort had recently been made in this country to reunite the arts of painting and architecture, the divorce between which took place in the seventeenth century, and had been so fatal to both, but more especially to painting, that it had yet to recover a great deal of lost ground. Mr. Burnell had objected to the names put upon the Fine Art Commission. It would be invidious to go over those names, but that commission included the name of the late Prince Consort, of Sir Charles Eastlake, and of almost all the best men that could be found whose opinion would be of value on a subject of this kind. The labour which the commission had given to this subject was something enormous. No efforts had been spared to collect information that was likely to be useful. The most able men were sent out to collect that information and when collected it had been presented to the Houses of Parliament in twelve reports, which were easy of access to all. Fresco painting was until recently an art unknown in this country. He was not aware of the existence of more than three fresco paintings in this country previous to the execution of the pictures in the Houses of Parliament, therefore, if that style of painting had not as yet been so successful as they could wish, it was not to be wondered at. At the same time he believed the frescoes in the corridors of the Houses of Parliament would compare favourably with those found in foreign countries; and

he thought the last picture there by Maclise, executed in the new material of water glass ("The meeting of Wellington and Blucher"), would challenge comparison with that of Kaulbach, in Berlin. As a first attempt with a new material he considered it was a great success, and he had no doubt this first effort would be greatly improved upon. Difference of opinion would exist as to whether fresco was the best method of painting for the corridors of the Houses of Parliament. He did not know, considering the facility our artists had in oil painting, whether it might not have been as well that those pictures should have been in oil, because in their situation in most cases the eye would not come within the angle of reflection, and no part of the subject would be lost. That was a point open to discussion, but he thought it extremely injudicious for any man to place his single opinion against the deliberate judgment of the body of men who had decided this question.

Mr. Philip Palmer remarked that in the allusions which had been made to the decoration of churches in this country by paintings, no mention had been made of painted glass windows, which had received great encouragement during the last quarter of a century. Twenty-five years ago, a stained glass window was a very rare thing, whilst at the present time they rarely saw a church without them. That, at all events, was a style of art which the church had patronised; and he quite agreed with the last speaker, that the best way to encourage the fine arts was to pay a good price for the work and employ the best men to do it. He believed the opinion was gaining ground that they must go abroad for the finest works of art; but still good works of art could be produced in this country at the present time, and if sound judgment were exercised, and such a price paid as would secure the best artist, they would obtain productions in art which would hold a place against those of any country in the world.

Mr. Robert Rawlinson, whilst agreeing with many of the sentiments expressed in the paper, differed from some of the inferences. It was very useful to examine what had been done in past years, but it might be fallacious to draw conclusions from this as to what a nation ought to do now. We must always consider the circumstances under which any great works were produced, and what was the object to be answered by those works. The great mediæval pictures were produced at a period when symbolism was employed to present in a visible form the great objects of faith and worship. He did not mean that worship was directed to the pictures, but they were intended to lead the mind to the subject represented in the picture, and there could be no doubt that the best men were chosen for the work, and were adequately paid for it. They were men who led honourable lives, who associated with princes, and all the power of personal emulation was brought to bear on the production of those works. It was unfair to refer to that age which had past away, and blame our artists for not producing works of equal excellence. He could mention names of artists of our own age, who, if they had received the same amount of patronage as was bestowed upon art in the mediæval periods, would probably have transmitted to posterity names as imperishable as those of Raphael, Michael Angelo, Leonardo da Vinci, and others. There was Haydon, whose aspirations were perhaps higher than his powers of execution; there was Hilton, who, had he been encouraged, judging from the works he had left behind him, would probably have gained immense renown for his grand historic and religious pictures, but he received but little encouragement, and died in poverty. He remembered to have seen in this room an exhibition of the pictures of Etty. For twenty-five years that artist painted without a single commission, and on seeing his pictures collected on these walls, it was a painful reflection that not one of them belonged to this nation or to this metropolis. Those great pictures were principally distributed in Manchester and Edinburgh. If it was found that failure and poverty waited on the study of high art, it was not to be wondered at that it was not followed. When the Fine Arts Commission called for works of a grand class, they would remember the cartoons that were exhibited in Westminster Hall; there sprang up almost at once an effort and power equal to the emergency that called them forth. There had been no demand for that class of art since then, and therefore the modern school of artists were occupying themselves upon domestic pictures; and, as far as his own knowledge went, he did not recollect any period in the history of art in which there was a finer class of domestic pictures painted than they had now, especially in water-colour landscapes. They had some artists now whose works, though *petites* and pretty, were, as far as they went, absolutely perfect,—nothing could go beyond them. Then as to architecture, he did not think the nation was worthy of so much blame. There were the Houses of Parliament, and although it might have been a mistake to have revived that special style of architecture, yet he did not hesitate to say that never upon the earth's surface was a finer block of buildings placed as regarded execution than the present houses of parliament. Then they had the Reform Club, by Barry, and St. George's Hall in Liverpool. With regard to sculpture, it was not fair to speak of it so discouragingly; as to the statues in the corridor of the Houses of Parliament, he had heard Mr. Gibson express an opinion that they constituted the finest group of portrait sculpture in existence; but if encouragement was not given to sculpture they could not expect any great works. They ought not to look to the past but to the present, and to the necessities of the period in which they lived. They ought to pay liberally for what they wanted, and if they did that, depend upon it they would not fail in developing the highest class of art.

The Chairman rose to propose that the thanks of the meeting be given to Mr. Burnell for his paper. He thought, with that gentleman—and that was the important statement conveyed in his paper—that their ecclesiastical and corporate bodies might do a great deal more for the encouragement of art than they had done. In point of fact, as Mr. Burnell said, they had done very little. It was only in the year 1851, that sculpture was placed in the niches of the Egyptian Hall at the Mansion House. He thought in our town-halls, clubs, great guilds, and city companies, more encouragement might usefully be given to Fine Art. It would add to the enjoyment of all who visited those places, and would exercise a beneficial influence upon the taste of the country generally. He did not quite agree with Mr. Burnell in his estimate of the present condition of art in England. He thought the British School of Art held its own in painting and sculpture; and certainly in both, as applied to manufactures, they had seen great improvements at the late International Exhibition. In point of fact he would say that the only rival we had in any branch of manufacture with regard to design was France, but in that Exhibition in many articles we successfully competed both in manufacture and design with our French neighbours, who had always held a higher reputation in the latter. Improvement was still going on in that direction. The various schools of art throughout the country were no doubt exercising a beneficial influence upon large numbers of persons engaged in industrial pursuits. With these few observations, he begged to propose a vote of thanks to Mr. Burnell for the paper he had read.

A vote of thanks having been passed,

Mr. Burnell acknowledged the compliment paid him. He had been unable to hear many of the remarks that had fallen from the different speakers, but he would say upon the subject of the revival of Gothic architecture, as remarked upon by Mr. Atkinson, it took place first of all through the instrumentality of Mr. Rickman and Mr. Pugin, the former gentleman being a Quaker and the latter a Roman Catholic; and therefore the Church of England had nothing to do with the matter. With regard to the observations of Mr. Rawlinson, that they ought not to think of comparing the institutions of other

times with those of the present day, he begged to say that he had distinctly stated in his paper, that he considered that little or nothing was now done by society at large to encourage art, that encouragement generally proceeding from individuals. What Mr. Rawlinson had said with regard to Etty was perfectly true, and confirmed that which he (Mr. Burnell) had urged—that they did not encourage high art now. That, he thought, was the great defect of society in the present day. He was perfectly prepared to expect that the ideas he had expressed would provoke a considerable amount of discussion.

The Secretary announced that on Wednesday evening next, the 11th March, a paper by Commander Bedford Pim, R.N., "On an International Transit Route through Nicaragua," would be read.

Home Correspondence.

COTTON SUPPLY.

Sir,—Not having been able to take a part in the discussion which took place on the cotton question at two recent weekly meetings, I beg to trouble you with a few observations on the papers of Mr. Shaw and Mr. Cheetham, and on the discussions which followed them.

I think almost everyone who reads these papers, and the observations of the various speakers who addressed the meetings, carefully and impartially, will agree with me that the immediate future of the cotton trade is not so gloomy and desponding as Mr. Cheetham thinks, and that the prospect of an adequate supply is not so bad, or the time when it will arrive so distant as the writers of the papers and most of the speakers appear to believe.

The following facts were generally admitted:—

1. That the extent of land under cotton cultivation is sufficient for the supply of the world, if proper attention is paid to it.

2. That India now produces more cotton than America ever did, the annual growth being estimated at from four to six millions of bales.

3. That the quantity produced is capable of great increase.

4. That Government interference is required only to give information to cultivators as regards quality and price, and to assist in making roads and railways.

5. That exotic cotton can be cultivated in India, and will realise remunerative prices.

6. That time only is required to bring the cultivation of exotic cotton into active operation, but that it is not easy to induce the natives to change their ordinary crops, or to satisfy them that they will realise the high prices quoted.

7. That, besides India, there are other countries, such as Brazil, Egypt, and West Africa, where cotton is grown, from which we may expect in the aggregate a largely increased supply.

8. That there are countries, such as the West Indies and Italy, where the cultivation has been neglected and almost lost, but in which cotton may be again profitably grown.

These facts, if not admitted by every speaker, were disputed by no one.

But it may be said, we can obtain the quantity we require but not the quality; and that, as the extra quantity would be obtained under the stimulus of existing high prices, the supply would fall off or decrease on the restoration of peace in the Southern States.

First, then, as to quality:—Many members of the Society will recollect the beautiful specimens of Indian muslin exhibited in our rooms some years ago, when a turban was unrolled and shown to consist of one piece of muslin of great length and width, of the most beautiful texture and fineness, and of which the quantity produced in India was said to be considerable.

If Indian cotton will produce such fine cloth as was then exhibited in the hands of native spinners, may we not expect as much from it in the hands of our Lancashire spinners? This fact surely disproves the assertion often made, that Indian cotton is not grown of sufficiently good quality to become a substitute for good or middling Orleans.

No doubt the quality of Surat cotton recently imported has been very inferior, but we must not forget the difference there will be in the quality of the cotton shipped when, instead of taking off a surplus at a very low price, the best cotton which can be found is purchased for specific orders and at highly remunerative prices.

Then as to price:—The ordinary price of Surat cotton, before the war, was 2¾d. to 4d. per lb.. and of New Orleans, 5d. to 6½d.; now the prices are, 2s. 6d. to 2s. 7d., and 1s. 8d. to 1s. 9d. respectively.

No one can doubt that if these prices continue for two years, or even for one year longer, such will be the stimulus to production all over the world, that we shall soon have cotton enough; and, putting India out of the question, a great deal of fine quality.

But what will be the probable price next year, if peace be made in America in the course of this year?

Will New Orleans fall to the price it bore before the war? Does any one believe that to be possible? Can cotton be grown in a highly taxed country, as the States of America must be, whether separated or united, as cheaply as it was in an untaxed country before the war?

Or if all the loans and debts be repudiated, and no taxes be required to pay the interest thereon, can such an impoverished country grow cotton as cheaply as when it was prosperous? And further, how long will it take to renew destroyed plantations—to reorganise labour—to reinstate damaged machinery, and to resume all the minor arrangements required for the pursuit of successful commerce?

If all the misfortunes, consequent upon civil war, can be overcome, it must be a work of years, and what will be the course of trade in India and all other cotton-producing countries during this period of time?

In every country likely to grow an important quantity of cotton the cultivation will be prospering under the influence of a few years of very high prices; and the quality will be as constantly improving as the cost of production will be decreasing.

The new mechanical appliances, and the expenses attending the extension of the area of cultivation, will be covered by the higher prices now, and for some time sure to be, current, so that when lower prices do come, as they assuredly will, they will be met by an untaxed and prosperous people, who will then be able to compete in price, and I hope in quality, with the highly taxed and impoverished Southern planters.

Instead, then, of New Orleans being exported profitably at from 5d. to 6½d. per pound, we may expect the planter will demand much higher prices, and East India cotton, dirty and badly packed, realising only 2¾d. to 4d. per pound, will, when properly packed and improved in quality, be sure to realise the same proportionate advance according to the supply from all parts of the world, which price will offer ample inducement to the ryot to continue his extended cultivation, and the more careful treatment of his crop.

In further illustration of these views, I will refer briefly to the discussions which took place on the papers read by Mr. Shaw and Mr. Cheetham.

The speakers on the first occasion were more philosophic, more hopeful, and more practical, than on the second, and fault-finding seemed to be dropped, each speaker being anxious to afford the best and largest amount of practical information in his power. This was

also the case, with one striking exception—Mr. Ashworth—last Wednesday, but following as he did the statesman like speech of Sir John Lawrence, his observations fell coldly on the meeting. He reproduced oft-refuted statements, and argued that as it was shown upon reliable authority that good cotton could be grown in India, there must be fault somewhere that it was not now ready to our hands, and that fault of course, in his opinion, rested upon the government alone.

Mr. Ashworth forgets that the Indians have not hitherto grown for export the quality that we want; indeed, there was no inducement for them to export it. He says, that had some one some years since done something, we should now have had cotton. But is this a true reading of the past? Indian cotton at the price it realised here offered no inducement to the ryot to displace other crops and to grow cotton largely for exportation—other produce did. Seeds, for instance. No sooner did the Russian war interfere with our ordinary supply, than these were obtained from India, and have from that time become an important article of commerce with India.

But on what ground could the Government induce the cultivators in India to grow cotton in preference to other crops, when the price was unremunerative, and while there appeared to be no limit to the supply of a superior quality, at a cheap rate, from a country which the great authorities of Manchester told us was governed with such wisdom by the people, that war, much less a desolating civil war, was all but impossible?

Whenever a fair price could be relied upon for any agricultural produce of India, we have always, and in a very short time, been supplied; and no doubt the same laws which have produced so large a quantity of sugar, seed, silk, and other things, will now ensure us an ample supply.

These, then, are my reasons for thinking that the future of cotton is not so gloomy and desponding as the Manchester school would induce us to believe, and why I do not concur in their statements in reference to the probable supply of cotton.

The course of trade, our exports and imports, and our revenue, for 1861 and 1862, show that public opinion—led, perhaps, by the constant appearance of the cotton interest before it, and by the assumption of superiority which has characterised the Manchester school during the last few years—has overrated the influence of this branch of trade on our national prosperity. The colonial interest, to which we are now so much indebted for the maintenance of our exports, and the cotton interest—the value of one having been underrated, and that of the other unduly magnified—will each now find their true level; and whilst the one is proceeding in a course of uninterrupted prosperity, I trust that we shall ere long see the other regain its wonted position in our commercial statistics.

But deploring and trying to relieve the distress caused by the disturbance in our supply of cotton as all must do, we must not forget that a large section of the trade and commerce of the country interested in cotton has benefited very largely by the shortness of the supply. The extra profit on the stocks of raw cotton held when the war began—the increased value of that larger quantity—the stocks of manufactured goods on hand at home and abroad—the extra profit which will be realised from the effect of reduced production, and also the avoidance of a commercial panic from over production, which all thinking men saw looming in the distance, are sources of compensation for the losses and difficulties which a large class must necessarily suffer from the stoppage of so many mills; but how much greater or less this loss is than would have followed another twelve months' production similar to that of 1860, is a question not easily determined.

On the whole, then, with respect to these papers on cotton, as with the series which have been read on previous occasions, I think the Society has much reason to be satisfied, for I believe its volumes now contain more original matter, on the growth and manufacture of cotton, than can be found in any other publication.

I am, &c.,

WM. HAWES.

Sir,—In the report of the few sentences spoken by me at the last meeting of the Society of Arts, the mistake of one word conveys a meaning quite different to what was intended.

I referred to "Ethiopia" above Egypt—not Egypt itself—as the country wherein the Egyptian cotton of commerce was introduced into Lower Egypt as recently as the year 1820; the production of this exotic plant having increased so rapidly in the latter country, as to have amounted to 150 millions of lbs. in the present season of 1862–3.

Under the general name of Ethiopia may be comprised (exclusive of Nubia) the countries of Taka, Atbara, and Sennar, all subject to the Viceroy of Egypt, with the adjoining independent kingdom of Abyssinia. Throughout all these regions the cotton-plant is indigenous—its wool having from the earliest ages been celebrated for its superior quality, and it is from thence that the article is now being sent to India.

Two years ago, at Manchester, I directed attention to the importance of Ethiopia as the native country of the fine Egyptian cotton—but in vain. It may, perhaps, be otherwise now that Ethiopia is forcing itself into notice as an exporting country.

I am, &c.,

CHARLES BEKE.

Bekesbourne House, Canterbury, March 2, 1863.

THE TRANSPORTATION QUESTION.

Sir,—One of the best results of the occurrences in London, during the late dark evenings and nights, has been the interesting "Winter's Tale," read by Mr. Isbister on the 21st January, which has led to much thought and discussion on the subject of convicts and their treatment.

Some years ago, a sojourn in both convict and non-convict colonies, induced me to investigate the subject more closely than I otherwise might have done, and, much to my regret, the question has recently, in a most disagreeable manner, forced itself upon my attention.

My object in writing these lines is not to treat of the general question of the punishment of crime in detail, but rather to point out how that portion of the subject included under the terms "transportation," or "home imprisonment," should be looked at in order to arrive at a sound conclusion as to the advisableness of adopting one or the other course.

Of late criminals have been almost entirely regarded from a convict's friend point of view, and notoriously the eye of the lover sees not the mole on his lady's cheek. Sympathy for the convict, whether maudlin or from a hearty desire to raise a degraded being into a wholesome condition of mind and body, is not conducive to a broad view of the whole question, or even to a right assessment of the value of the principal item in the matter, but interests the mind, microscopically, in a very small portion of the whole.

Now, Sir, it seems to me that there are several groups of persons whose interests, views, and even inclinations—call them prejudices if you will—ought to be, and must be, studied in preference to the criminal:—

1.—The Innocent, Harmless Public.—The wearing occupations of modern life, particularly of those persons whose lot is cast in London or other large cities, demands at least that exhausted nature should be restored as far as possible by sound healthy repose.

But the conditions necessary to secure this very moderate expectation are decidedly wanting, when during one and the same night the two houses adjoining to our own have been entered and plundered, and next we find that in broad daylight our neighbour on the other side has

been robbed to a serious extent; and worse still, within a mile from our home some dozen houses have been broken into during the present winter by desperate burglars, and in only one instance have the parties been traced, and that not a night attack. A policeman who endeavoured in one case to secure a fellow was so worsted in the conflict as to be left disabled, seriously injured, on his beat.

Instead of enjoying sound sleep, we listen for the stealthy tread in goloshes of the burglar's foot, the wrenching of a shutter, or the picking of locks; while silent matches, birdlime plaisters, jemmies, bits of candle, &c., found on the premises, indicate such a judicious selection of means for the accomplishment of the desired end as almost to deserve success.

Such being the unexaggerated state of the case, not in one locality, but in many, is it to be wondered at that men are beginning to inquire, for what purpose are rates and taxes paid? Every attention is given to defend us from our foreign enemies, and "Warriors" and Armstrong guns are provided without stint, but against the more dangerous foes, our home-bred ones, no protection is afforded.

Unquestionably the Government has this winter utterly failed in its primary duty, the protection of the innocent.

If this state of things is to continue, let us be advised of the helplessness of our bounden protectors, and then, with such appliances as private arrangements may enable us to procure and use, and with the triple armour of a just quarrel, it will be rather hard if the burglar does not come worst off.

Everyone expects that fresh criminals will be continually produced; but we maintain that directly it was shown that the mass of crime this last winter was the seething of old criminals, it was the duty of the Government to the public, and would have been humane to the poor wretches themselves, to have called in every ticket-of-leave man who, in such a time of distress, could not clearly show that he was earning his living by proper and honest means.

Life and property must be made secure in England; a condition of things that does not at present exist. The innocent public must be considered before the comfort or reformation of the convict, and whatever means may be found necessary to secure this object must be adopted, however much against our kindly feelings.

2.—Employers and Workmen.—Convict sympathisers have seldom been engaged in practical business, otherwise they would understand more fully the difficulties in the way of giving employment to, or obtaining it by, the class under consideration. Directly it is known that an employer has a vacancy for one workman, probably ten men apply for the situation, and of these ten one may be a ticket-of-leave man, and the other nine men of untainted character. Surely it is not more than scant justice to integrity to provide all the nine with work before the criminal, it being, of course, assumed that they are as efficient workmen; nay, further, it would be wrong in my opinion to select him until all the rest had found employment. I shall be reminded of the "lost sheep," &c.—true, but the unwandering sheep were in the fold, "feeding," the nine men in the case supposed are just in the condition of wanting food.

Again, workmen in many factories would not associate with a released prisoner; and who but must approve of the *esprit de corps* which shuts the door of the workshop against the thief, garotter, and murderer. I should lament to see the day when the British workman had become indifferent to the fact whether his mate was a convict or free man. I cannot learn that the humanitarians, who so warmly advocate the employment of ticket-men, select such to be their grooms, valets, coachmen, butlers, &c., and until they do their argument is very one-sided.

3.—The Colonies.—In the present advanced condition of many of our colonies, it is more a question of the balance of advantages, than the moral aspect of the subject, which decides their opinion on the convict question, and proof of this is found in the fact that while New South Wales, Victoria, Van Dieman's Land, convict-founded colonies, repudiate all idea of receiving further supplies of that article, West Australia appears to be quite willing to welcome as many as we choose to send thither, subject to some few restrictions.

Undoubtedly the introduction of the convict element into a colony founded by free persons, would seldom or never be attended with good, for although their labour might be cheap to those settlers to whom they might be assigned, this, in itself, would lower the rate of wages and thereby deter free men from emigrating to such colony; and I apprehend that the reason why West Australia is still willing to receive convicts is to be found in the fact, that, owing to various circumstances, free men are not attracted thither in large numbers. Nevertheless, it must be borne in mind that the Australian colonies have risen to their present position by convict labour, the roads and public works having been constructed by convicts.

Formerly the settler had the benefit of the cheap labour of convicts by simply undertaking to provide them with rations and clothes equal to those supplied by the government, which was thereby relieved from their support, while the settlers who obtained their services without payment of wages, in many cases sold the crops, the result of such labour, to the government, for the support of the non assigned convicts employed on public works.

The state of things now existing in Australia has been, to a great extent, rendered possible and brought about by the works accomplished in the previous half century by "persons held to servitude." To judge fairly on the question of Australian convictism, we must go back to the period when few, if any, free persons had the slightest idea of visiting Australia, and when that unknown land (barely to have traversed which is rightly deemed at the present time, and that by colonists on the fringe of the great continent, an achievement worthy of all honour) was specially selected by the government of the day, as a distant, comparatively uninhabited spot, and we think it was so selected, wisely, and with good results to England, the future colonies themselves, and the world.

4.—The Convict.—If the public ought to be protected, if there are circumstances in which employers cannot, and ought not, to employ convicts, if workmen will not associate with such, and our colonies, for the most part, will not have them, all of which positions must be assented to, what is to be done? Although it is very hard that an intended boon should prove to be an evil, continued observation has confirmed the truth of the following remarks, which I penned and published several years ago on this subject:—

"Hundreds of criminals were yearly transported from the mother country to found a new Britain in the southern world, and tickets-of-leave were granted as rewards for good behaviour, which passes or certificates, while they prohibited the recipients from leaving the colony, permitted them to work for their own benefit, either by labouring for hire or engaging in business as principals, and a new life being thus opened to these persons, many become rich and honourable.

"Tickets-of-leave in a new unpeopled country, with scarcity of labour, are sources of undoubted good to the condemned, in whom hope is thus revived, and a new opportunity afforded of fulfilling the moral and social duties, and obtaining the advantages of life; and surely such a result is in every respect desirable. The colonists, also, benefit by this system, being enabled to obtain more abundant and economical labour.

"The question of tickets of leave in an old or peopled country assumes an entirely different aspect, for when ten free applicants compete for every vacant post of labour, it is cruelty to the criminal to start him afresh in the race of life with a tremendous blot on his name, and at fearful odds with the unconvicted. He has scarcely any chance of subsistence, but by resorting to his previous course of life, with such additional skill and intensified vice as his

prison thoughts and companions may have suggested. Prison piety is hypocrisy.

"Moreover, it is an unfair slur upon the untarnished character of the free artizan, who, if a convict workman is accepted to his prejudice, infers that virtue goes for nothing with employers; and those who may be required to work with ticket men must either give up their employment or lower their tone of morals, by associating at the same bench with convicted thieves and murderers.

"By going to a new colony, the free labourer voluntarily seeks competition with the felon population, and these objections do not obtain.

"The fresh locating of felons in any given place, or the discontinuance of transportation to any particular colony, depends upon other considerations. Here is simply discussed the question of tickets-of-leave in an old country, or the contrary—it is, without doubt, an intense, unmitigated evil."

Sentences should be uniform, moderate, and certain; the irregularity of the present system in these respects is very prejudicial to society.

The convict has forfeited all title to considerations of comfort; therefore, to be fed better and more regularly, to be more lightly worked, and far better protected from exposure than if he had pursued a course of honest labour, all tending to induce acquiescence in his lot, and to cultivate in him the notion that he is rather a pet, and the interesting object of attention and deep sympathy on the part of the public, is wrong, in my humble opinion.

Is this punishment? Is this a warning? Should not the object be to convince him that by working harder than if he had been an honest man he may live with some chance of comfort, and only by working very hard indeed can he ever hope to shorten the term of his punishment, and but one test, that of labour, should be admitted. If his religious convictions be deep, as is so frequently reported, let him show it by his disposition to work. "Shew me thy faith by thy works" should be the perpetual daily text of prison chaplains.

Except in some very extraordinary cases I could not approve of the suggestion to immure human beings in prison for life; it would be destructive of hope, a condition which every right-minded man would shrink from inflicting upon any rational thinking being—a living death. Hope through work—through hard work—is the inducement to reform which I would hold out to the most depraved. Moreover, by this plan of prison confinement, one of the most humanizing of the instincts of men—the family—is altogether lost sight of. An unprejudiced witness, Victor Hugo, in "Les Miserables," thus testifies to this point:—

"The most terrible thing for the prisoner within the four stone walls which forms his sepulchre is a sort of freezing chastity."

It was formerly not an unknown thing for the wife of a criminal to follow him to the colony; in some cases the husband was assigned to the wife, and, circumstances being favourable, they frequently reached a respectable position, to which they would not have had the slightest chance of attaining in the mother country.

Nor can I agree with the deduction that, because so many crimes have been committed of late by ticket-of-leave men, that they are irrecoverable. Many of them would reform if they had an opportunity, but what and all I contend for is, that in the majority of cases they have not now, never will have, cannot possibly have, an opening for restoration in an old populous country like England; they have no honest mode of life open to them. Hence, then, I can see no objection to the formation of a penal settlement in the district pointed out by Mr. Isbister, or, perhaps preferably, because they are islands, in the Falkland Islands. The climate is not severe; they are habitable, because Englishmen do go there voluntarily; they are very sparsely settled, and although not so pleasant as Australia, the comfort of the parties intended to be sent thither ought not to be studied. They should be permitted and encouraged in the settlement upon small farms, and those having wives be allowed, after a term, to send for them, and although we have no fanciful notion that any large proportion would turn out poetical model communities—Pitcairn Islanders—we do think three advantages would arise: many would reform; others would adhere to their old courses, and get hanged; and the old country would only have to attend to her annual crop of weeds.

I hope I have shown in the preceding remarks that while it is an absolute necessity to prevent the unhappy defenceless public from the recurrence of such events as have taken place during the past winter, we are neither compelled to shut up criminals for a life-long death within dungeon walls, nor to exclude hope from their minds, but to temper justice with mercy is the true course. And notwithstanding the willingness of West Australia still to receive convicts, I do not concur in the opinion that it would be advisable to inundate that colony, neither would it be good to found fresh convict settlements in the northern part of Australia, because free settlements are rapidly creeping up all along that shore, and nothing is so injurious to a free small community as the neighbourhood of a penal settlement.

Rather I should prefer trying either or both the Falklands and the American territory; both are readily accessible but not so easy to escape from, and after trial could only be given up if found not to answer the purpose.

I am, &c.,

WILLIAM STONES.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. "Recent Explorations in Australia," by Messrs. MacDonald Stuart, Landsborough, McKinlay, &c.
British Architects, 8.
Medical, 8½. Clinical Discussion. Dr. Thudichum, "On Cancer of the Pancreas; and on Purulent Disease of the Kidney, complicated with Disease of the Bladder," and other communications.
Syro-Egyptian, 7½. 1. Mr. Bonomi, "Drawings of Egyptian Objects in the Museum of the Duke of Northumberland, at Alnwick." 2. Mr. Ainsworth, "Watershed of the Nile."

Tues. ...Medical and Chirurgical, 8.
Zoological, 9.
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."

Wed. ...Society of Arts, 8. Commander Bedford Pim, R.N., "On an International Transit Route through Nicaragua."
Graphic, 8.
Microscopical, 8.
Literary Fund, 2. Anniversary Meeting.
R. Soc. Literature, 8½.
Archæological Association, 8½. Mr. Syer Cuming, "On Bracteate Coins."

Thurs...Royal, 8½.
Antiquaries, 8½.
Royal Soc. Club, 6.
Royal Inst., 3. Dr. E. Frankland, "On Chemical Affinity."

Fri.......Astronomical, 3.
Royal Inst., 8. Dr. J. H. Gladstone, F.R.S., "On Fogs and Fog Signals."
Royal United Service Inst., 3.

Sat.......Royal Botanic, 3¾.
Royal Inst., 3. Professor Max Muller, "On the Science of Language." (2nd Series.)

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, February 27th*, 1863.]

Dated 21st November, 1862.

3129. W. E. Gedge, 11, Wellington-street, Strand—An improved elastic fastening for gloves. (A com.)

Dated 12th January, 1863.

98. A. I. Mahon, 25, Leinster-square, Rathmines, Dublin—Imp. in screw and paddle propellers, and a submarine propeller, also applicable to the raising and forcing of water or other fluids.

Dated 26th January, 1863.

228. A. Smith, Mauchlin, Ayrshire, N.B.—Imp. in certain parts of staples, locks, bolts, latches, and other similar fastenings.

Dated 30th January, 1863.

277. J. W. Branford, March, Cambridgeshire—Imp. in horse-hoes, and in the means of using the same in husbandry.
283. W. E. Gedge, 11, Wellington-street, Strand—Imp. in hair nets. (A com.)

Dated 2nd February, 1863.

294. J. Gibson, Heptonstall, Halifax—Imp. in looms for weaving.

Dated 6th February, 1863.

334. A. Johnston, Comely Bank, near Edinburgh—Imp. in the propulsion of vessels.
336. A. Clarke, Staines, Middlesex—Imp. in knife-cleaning apparatus.
338. W. Robins, 4, Dame-street, Islington—Imp. in the construction of fire lighters or faggots.
340. R. D. Tivnann, Wordsley Brass Foundry, Staffordshire—Imp. in holster boxes, or boxes for screws or pins to work in, and in the manufacture thereof.

Dated 7th February, 1863.

342. J. Cameron, Hematite Iron Works, Barrow-in-Furness, Lancashire—Imp. in the manufacture of iron and alloys of iron.
344. J. Mallison, jun., Bolton-le-Moors, Lancashire—Certain imp. in the process and method of dyeing yarns.
346. W. T. Cooper, Tooley-street—Imp. in distilling apparatus.
348. W. Clark, 53, Chancery-lane—Imp. in the application of gas for the preparation of wood work generally and iron ships for their better preservation and reception of paint or other protecting coating, and for disinfecting ships, hospitals, and other places. (A com.)
350. J. Miller, Glasgow, and W. Struthers, Hamilton, Lanarkshire—Imp. in securing the corks, stoppers, or lids of bottles, jars, and other similar vessels.
352. G. Redrup, Loughborough—Imp. in machinery for the cutting of shives, bungs, corks, spiles, and vent or other pegs, and also in machinery for manufacturing the knives or cutters employed therein, such machinery being also applicable to the manufacture of trenails and other cylindrical and conical articles.

Dated 9th February, 1863.

354. B. Dobson and E. Barlow, Bolton—Certain imp. in carding engines. (A com.)
358. J. Goucher, Worksop—Imp. in regulating the admission of air into the furnaces of steam boilers.
360. W. B. Rooff, 7, Willow-walk, Kentish Town—An improved respirator.

Dated 10th February, 1863.

362. T. Hill, Hampton-house, Great Warley, Essex—Imp. in the arrangements employed for the protection of markers at rifle butts.
364. M. Wigzell, Strand, Topsham—Imp. in machinery or apparatus and method to be used in the manufacture of every description of candles, tapers, and other lights.
366. J. F. Bottom, Nottingham—Imp. in the means or apparatus for dressing lace and other fabrics.

Dated 11th February, 1863.

368. A. Corneau, Charleville, France—An improved hot air stove.
370. E. T, Hughes, 123, Chancery-lane—Imp. in apparatus for drilling wood, stone, iron, or other materials. (A com.)
372. D. Radcliffe, Liverpool—Imp. in valve taps.
376. R. A. Brooman, 166, Fleet-street—Imp. in photographic apparatus. (A com.)

Dated 12th February, 1863.

380. E. Kemp, J. Needham, and O. Robinson, Ashton-under Lyne—Certain imp. in self-acting mules for spinning.
381. A. Morton, Arbroath, Forfar—Imp. in lawn mowing machines.
382. W. Clark, 53, Chancery-lane—Imp. in the bearing surfaces of shafts and other axles. (A com.)
383. S. H. Phillips, Newgate-street—An improved fastening for purses, portemonnaies, pocket books, bags, reticules, and such like purposes.
384. S. Lamb, Whitehall Works, Leeds, and J. Spink, Oxford-road, Sheffield—Imp. in machinery for tenoning, grooving, sawing, and otherwise cutting wood.

Dated 13th February, 1863.

385. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in processes or means employed for separating or extracting silver or other metals from lead. (A com.)
387. W. E. Godge, 11, Wellington-street, Strand—Improved table apparatus for promoting the comfort of persons at sea. (A com.)
389. J. F. Spencer, Newcastle-on-Tyne—Imp. in steam-engines.
391. J. Grantham, 31, Nicholas-lane—Imp. in hydraulic presses.
395. J. A. Schlumberger, Golden-square—Imp. in treating coal tar dead oils, and for producing phenic or carbolic acid. (A com.)

Dated 14th February, 1863.

403. W. Bayliss and T. H. Hopwood, Hulme, Manchester—Imp. in tongs or forceps for grasping articles out of reach of the hand.
405. J. Lewis, 5, Wych-street, Strand—Imp. in driving sewing machines.
407. T. Thorne, Southsea, Hants—Improved apparatus for disengaging ships' boats.
409. A. J. Fraser, Water-lane, Great Tower-street—Imp. in window furniture or fastenings.
413. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in wrought iron casements, and in the means for fastening the same, which improvements are also partly applicable to the framework of glass doors, conservatories, and similar structures. (A com.)

Dated 16th February, 1863.

415. J. W. Crossley, Brighouse, Yorkshire—Imp. in press papers, and in the method or means of drying them, and other similar sheets of paper, applicable also for the drying of woven fabrics, yarns, wool, cotton, or other fibrous substances.
417. W. C. McEntee, Birmingham, and G. Withers and T. Withers, West Bromwich—Imp. in locks.
419. H. Smith, 3, Regent's-park-terrace, Gloucester-gate—Imp. in apparatus for feeding horses.
421. W. Jackson, Liverpool—Imp. in pumps.
423. S. W. Clough, Stanningley, Yorkshire—Imp. in signalling on railways.
425. T. Wilkinson, Rathmines, Dublin—Imp. in machinery or apparatus for singeing pigs.

Dated 17th February, 1863.

427. J. Lee, Church-gate, Leicester—Imp. in ploughs and harrows.
429. W. C. Ford, Brooklyn, New York—An imp. in paddle-wheels.
433. G. Home, Kensall green—Imp. in projectiles.
435. S. Pluchart, Paris—A new kind of food for horses.
437. D. Tassin, 30, Rue du College, Liege, Belgium—Imp. in preventing the explosion of steam boilers.

Patents Sealed.

[*From Gazette, February 27th*, 1863.]

February 27th.

2433. A. Johnston.
2438. W. H. Atkinson.
2440. E. Dyson.
2441. R. A. Brooman.
2443. P. J. Bossard.
2448. H. L. Emery.
2450. J. Platt & W. Richardson.
2460. S. H. Huntley.
2462. S. Pudney.
2472. J. Hartshorn and W. Redgate.
2476. A. J. Alderman.
2493. A. Rigg, jun.
2507. J. Walker and F. Walker.
2510. A. Whytock.
2511. B. E. H. B. Butler.
2541. S. Flexen.
2646. J. Bucknall.
3259. R. Hornsby, jun.

[*From Gazette, March 3rd*, 1863.]

March 3rd.

2453. H. W. Hart.
2458. S. H. Hadley.
2459. J. R. Johnson and J. A. Harrison.
2461. J. Snider, jun.
2463. H. Hughes.
2464. E. L. Duncan.
2469. F. D. Artingstall.
2474. G. W. Belding.
2481. W. Hirst.
2487. W. Rothera.
2489. J. Vigouroux.
2504. J. Thomson.
2508. P. Ward.
2509. T. Molineux.
2555. J. H. Johnson.
2563. T. Watts.
2606. W. Maddick, jun.
2729. J. B. Palser.
2735. J. Lowe and J. Harris.
2792. G. T. H. Pattison.
2793. G. T. H. Pattison.
2794. H. A. Remiere.
2818. J. Tangye.
2824. J. B. Payne.
2857. M. C. A. Perkes.
3123. J. W. Hjerpe, W. Holmgren, and A. V. Sundstedt.
3163. G. Henderson.
41. W. E. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, March 3rd*, 1863.]

February 23rd.

504. R. A. Brooman.
519. C. W Siemens.

February 24th.

505. J. J. Baranowski.
543. E. I. Asser.

February 25th.

537. P. H. Desvignes.
828. R. Lakin and J. Wain.

February 26th.

546. G. Weir.
578. H. Bessemer.
590. W. Bauer.
2287. T. Briggs.

February 27th.

542. R. Walker.
589. W. G. Ramsden.
615. P. Hugon.

February 28th.

573. D. Chadwick and H. Frost.
594. C. Schiele.
629. T. Veal.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, March 3rd*, 1863.]

February 23rd.

528. J. Reading.

February 24th.

562. H. D. Pouchin.

February 25th.

512. J. Fowler, jun., & D. Greig.
538. R. Maynard.

February 26th.

534. F. Kaselowsky.
630. H. Bessemer.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4540	Feb. 12.	Guard and Neck Chain	John Mantle	Birmingham.
4541	,, 23.	Dessert Case for Cutlery	A. W. Cooper	Sheffield.
4542	,, 26.	Parasol	John Weeks	54, Baker-street, Portman-square, W.

Journal of the Society of Arts.

FRIDAY, MARCH 13, 1863.

SOCIETY OF ARTS EXAMINATIONS, 1863.—NOTICE TO LOCAL BOARDS.

The attention of Local Boards is particularly called to Par. 14 of the Examination Programme, as follows:—

14. The previous Examinations must be held by the Local Boards sufficiently early in the year 1863 to allow the results to be communicated to the Council, on a Form which will be furnished on application (see Form No. 2 in Appendix, page 11), on or before the 1st April, when the required number of copies of Form No. 4 will be forwarded to each Local Board. These should be filled up and returned by the 7th April, *i.e.*, four weeks before the commencement of the Final Examinations.

Any Local Boards expecting to have candidates desiring to be examined in Music, should apply to the Secretary of the Society of Arts without delay, who will furnish them with a form of test to be used at the Previous Examination in that subject, as explained in Par. 111 of the Programme.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary.*

The subscription of each member is limited to one guinea.

The following is the list of subscribers up to the 12th inst.:—

Adams, Thomas	£1	1	0
Adams, George G.	1	1	0
Adams, George William	1	1	0
Addington, Right Hon. Henry Unwin	1	1	0
Adley, Charles Coles	1	1	0
Akroyd, Edward	1	1	0
Alger, John	1	1	0
Allen, Thomas	1	1	0
Ames, John	1	1	0
Anderton, James	1	1	0
Andrew, W. P.	1	1	0
Artingstall, George	1	1	0
Atkinson, William	1	1	0
Austin, James	1	1	0
Avery, Thomas Charles	1	1	0
Bacon, Jacob Perkins	1	1	0
Bagnall, Charles	1	1	0
Balleras, Guillermo Esteban	1	1	0
Barber, Charles	1	1	0
Barry, Dykes	1	1	0
Bartlett, William E.	1	1	0
Baylis, W. Henry	0	10	6
Beckwith, Edward Lonsdale	1	1	0
Belcher, Rear-Admiral Sir Edward	1	1	0
Bell, John	1	1	0
Bentley, Robert J.	1	0	0
Best, Hon. and Rev. Samuel, M.A.	1	1	0
Beyer, Charles F.	1	1	0
Birkett, John	1	1	0
Bischoff, James	1	1	0
Black, Alexander	1	1	0
Blagden, George	1	1	0
Blaine, Delabere Roberton	1	1	0
Bodkin, William Henry	1	1	0
Boileau, Sir John P., Bart., F.R.S	1	1	0
Bosanquet, George Jacob	1	1	0
Bowley, Robert K.	1	1	0
Boyd, James	1	1	0
Braby, Frederick	1	1	0
Brassey, Thomas	1	1	0
Breillat, E.	1	1	0
Bremner, Samuel	1	1	0
Brett, John W.	1	1	0
Brickwood, John Strettell	1	1	0
Bright, Sir Charles	1	1	0
Broad, Robert	1	1	0
Brook, Charles	1	1	0
Brooke, Charles, F.R.S.	1	1	0
Brooke, John	1	1	0
Brookes, William	1	1	0
Brooks, Henry	1	1	0
Browell, Edward M.	1	1	0
Brown, Henry	1	1	0
Brown, Sir William, Bart.	1	1	0
Browne, Edward	1	1	0
Budgett, John P.	1	1	0
Burgoyne, Gen. Sir John F., Bart., G.C.B., F.R.S.	1	1	0
Burton, William S.	1	1	0
Cama, M. H.	1	1	0
Candy, Charles	1	1	0
Caplin, Madame R. A.	1	1	0
Champion, Percival	1	1	0
Chance, Robert Lucas	1	1	0
Charlton, Henry	1	1	0
Chater Joseph	1	1	0
Chester, Harry	1	1	0
Christie, Robert Monro	1	1	0
Clabon, John M.	1	1	0
Clutton, John	1	1	0
Cock, John, Junr.	1	1	0
Coghlan, H. T.	1	1	0
Cole, Henry, C.B.	1	1	0
Cooper, William	1	1	0
Cope, Walter	1	1	0
Corbett, John	1	1	0
Corderry, Edward	1	1	0
Cosens, Frederick W.	1	1	0
Coulson, William	1	1	0
Courtauld, Samuel	1	1	0
Creed, Henry	1	1	0
Critchett, Charles (Assistant Secretary)	1	1	0
Cubitt, William	1	1	0
Cullingford, W. H.	1	1	0
Curling, Joseph	1	1	0
Crawford, Robert Wygram, M.P.	1	1	0
Darby, Abraham	1	1	0
Davenport, Samuel Thomas (Financial Officer)	1	1	0
Davidson, Thomas	1	1	0
Dawbarn, George	1	1	0
Dawbarn, Richard W.	1	1	0

Dawbarn, Robert	1	1	0
Dawson, Henry	1	1	0
Day, William	1	1	0
Debary, Peter Francis	1	1	0
Dickson, Peter, F.R.G.S.	1	0	0
Dilke, Sir C. Wentworth, Bart.	1	1	0
Dilke, Charles W.	1	1	0
Dines, George	1	1	0
Dix, Thomas	1	1	0
Dixon, Thomas	1	1	0
Docker, F. W.	1	1	0
Dowleans, A. M.	1	1	0
Drax, J. S. W. S. Erle, M.P.	1	1	0
Dunn, Thomas	1	1	0
Dutton, William C.	1	1	0
Eamonson, Joshua J.	1	1	0
Eastham, John	1	1	0
Easton, James	1	1	0
Easton, Percy Shand	1	1	0
Ebury, Lord	1	1	0
Elliot, William Henry Fletcher	1	0	0
Ellis, William	1	1	0
Ethelston, Rev. Charles Wickstead, M.A.	1	1	0
Evans, E. Bickerton	1	1	0
Evans, Jeremiah	1	1	0
Ewart, William M.P.	1	1	0
Faraday, Michael, D.C.L., F.R.S.	1	1	0
Faulkner, John, Junr.	1	1	0
Fauntleroy, Robert Thomas	1	1	0
Field, John	1	1	0
Field, William	1	1	0
Foley, Lord	1	1	0
Fordham, Thomas	1	1	0
Foster, P. Le Neve (Secretary)	1	1	0
Fox, Sir Charles	1	1	0
Fowler, Robert N.	1	1	0
Freer, Rev. Richard Lane, D.D.	1	1	0
Fussell, Alexander	1	1	0
Garling, Henry	1	1	0
Geeves, William	1	1	0
Gilbart, James William, F.R.S.	1	1	0
Goding, Charles	1	1	0
Godwin, George, F.R.S.	1	1	0
Gonzaga, H. S. H. the Prince Alexander of, and Duke of Mantua	1	1	0
Gooch, Joseph H.	1	1	0
Gooch, Thomas	1	1	0
Goode, Thomas	1	1	0
Gordon, Col. W. J., C.B., R.E., D.A.G.	1	1	0
Gould, Charles Augustus	1	1	0
Graham, Peter	1	1	0
Graham, Thomas, D.C.L., F.R.S.	1	1	0
Graham, William	1	1	0
Grant, Alexander	1	1	0
Grey, Major-General the Hon. Charles	1	1	0
Grove, W. R., Q.C., F.R.S.	1	1	0
Gruneisen, Charles Lewis	1	1	0
Hack, Thomas	0	10	6
Haden, F. Seymour, F.R.C.S.	1	1	0
Hall, Walter	1	1	0
Hamilton, Edward	1	1	0
Hamilton, Sir Robert N. C., Bart.	1	1	0
Hammond, William Parker	1	1	0
Hancock, James Lyne	1	1	0
Hancock, Frederick William	1	1	0
Hanhart, Michael	1	1	0
Hannay, John	0	10	6
Hannay, Robert	1	1	0
Hannay, Robert, Jun.	0	10	6
Hannay, Thomas	0	10	6
Hannington, C. S.	1	1	0
Harrison, Henry	1	1	0

Harrison, Thomas E., C.E.	1	1	0
Hawes, William	1	1	0
Hawkshaw, John, F.R.S.	1	1	0
Hayward, T. Carlyle, Jun.	0	10	6
Headland, Edward	1	1	0
Heane, Henry	1	1	0
Heather, James	1	1	0
Hereford, the Dean of	1	1	0
Heymann, Lewis	1	1	0
Heywood, James	1	1	0
Hick, John	1	1	0
Hicks, Thomas	1	1	0
Hollins, Michael Daintree	1	1	0
Holmes, Alfred William	1	1	0
Holmes, Herbert Mountford	1	1	0
Holmes, James	1	1	0
Hooper, Bartlett	1	1	0
Horton, Isaac	1	1	0
Horton, John	1	1	0
Howard, Thomas	1	1	0
Imhof, Daniel	1	1	0
James, Jabez	1	1	0
Jewesbury, H. W.	1	1	0
Joel, Joseph	1	1	0
Johnson, Henry	1	1	0
Johnson, Jabez	1	1	0
Jones, James W.	1	1	0
Jones, Owen	1	1	0
Jones, Richard Lambert	1	1	0
Keeling, Herbert Howard	1	1	0
Kelk, John	1	1	0
Kemp, George T.	1	1	0
Khaznadar, S. E. le Général Moustapha, Premier Ministre de S.M. Tunisienne	1	1	0
Lacy, Henry Charles	1	1	0
Lambert, Thomas	1	1	0
Lawrence, Frederick	1	1	0
Larnach, Donald	1	1	0
Le Couteur, Col. John, F.R.S.	1	1	0
Leeks, Edward Frederick	1	1	0
Leighton, John, F.S.A.	1	1	0
Levi, Leone	1	1	0
Lewis, Stephen W.	1	1	0
Longstaff, G. Dixon, M.D.	1	1	0
Lucas, Thomas	1	1	0
Macarthur, Major-Gen. Sir Edward, K.C.B.	1	1	0
MacDonald, J. C.	1	1	0
Macfarlane, Walter	1	1	0
Maclaran, George	1	1	0
Maclea, Charles G.	1	1	0
Malcolm, Major-Gen. G. A.	1	1	0
Manby, Charles, F.R.S.	1	1	0
Marryatt, Joseph	1	1	0
Marsh, Matthew Henry, M.P.	1	1	0
Martin, John	1	1	0
Martin, Thomas	1	1	0
Martineau, David	1	1	0
Martyn, Silas Edward	0	10	6
Matthew, James	1	1	0
May, Harry	1	1	0
McMurray, William	1	1	0
Mechi, Alderman	1	1	0
Merle, William Henry	1	1	0
Middleton, David	1	1	0
Miles, Alfred W.	1	1	0
Mocatta, Benjamin	1	1	0
Moore, Charles	0	10	6
Morant, Robert	1	1	0
Moulton, Stephen	1	1	0
Muir, William	0	10	6
Mulready, William, R.A.	1	1	0

Munn, Major W. A.	1	1	0
Murchison, J. H.	1	1	0
Murchison, Sir Roderick Impey, K.C.B., D.C.L.	1	1	0
Napier, Robert	1	1	0
Navroji, Dádábhái	1	1	0
Newcombe, S. Prout	1	1	0
Noble, Matthew	1	1	0
Oldershaw, Capt.	1	1	0
Pagden, Stephen	0	10	6
Pakington, Sir John S., Bart., M.P.	1	1	0
Palmer, George	1	1	0
Paul, J. Michell	1	1	0
Pearce, Alfred B.	1	1	0
Penn, John	1	1	0
Petrie, Samuel	1	1	0
Pierce, William	1	1	0
Phelps, Charles	1	1	0
Phillips, Sir Thomas, F.G.S.	1	1	0
Potter, Thomas	1	1	0
Preller, C. A.	1	1	0
Price, Arthur J.	1	1	0
Proctor, John	1	1	0
Provis, William Alexander	1	1	0
Pryor, William S.	1	1	0
Quain, Richard, M.D.	1	1	0
Radstock, Lord	1	1	0
Ratcliff, Charles	1	1	0
Rawson, W. H. Jun.	1	1	0
Redgrave, Samuel	1	1	0
Reeve, Charles	1	1	0
Reeves, John Russell, F.R.S.	1	1	0
Reid, Lestock Robert	1	1	0
Reiss, James	1	1	6
Reveley, Henry W	0	10	0
Rivett, Joseph Cedric	1	1	0
Rixon, Alfred H.	1	1	0
Robb, Alexander	1	1	0
Roberts, Henry, F.S.A.	1	0	0
Rodocanachi, M. E.	1	1	0
Routledge, Thomas	1	1	0
Russell, Capt. G.	0	10	0
Russell, John	1	1	0
Russell, John James	1	1	0
Russell, John Scott, F.R.S.	1	1	0
St. David's, Bishop of	1	1	0
Salomons, Aaron	1	1	0
Salomons, David	1	1	0
Salt, Titus	1	1	0
Sargood, F. J.	1	1	0
Saul, G. T.	1	1	0
Schneider, Richard	1	1	0
Sedgwick, John Bell	1	1	0
Shearer, Bettesworth Pitt	1	1	0
Sheriff, G. W	1	1	0
Shove, W. Spencer	1	1	0
Sibthorp, Henry, A. M. W.	1	1	0
Sich, Henry	1	1	0
Silverlock, H.	1	1	0
Simon, George	1	1	0
Simpson, William Butler	1	1	0
Smart, Sir George T.	1	1	0
Smith, George	1	1	0
Smith, George	1	1	0
Smith, J. Scott	1	1	0
Smith, R. M.	1	1	0
Smith, T. Mosdell	1	1	0
Sopwith, Thomas, F.R.S.	1	1	0
Spicer, Henry	1	1	0
Spicer, William Revel	1	1	0
Stanton, George	1	1	0
Stephens, Charles	1	1	0
Stephens, Henry	1	1	0
Stirling, Thomas	1	1	0
Stohwasser, Joseph	0	10	6
Straker, John	1	1	0
Styles, Thomas	1	1	0
Sugden, Samuel	1	1	0
Sulivan, Right Hon. Lawrence	1	1	0
Symonds, Capt. R.N.	1	1	0
Sykes, Col. W. H., M.P., F.R.S.	1	1	0
Taylor, George	1	1	0
Taylor, John	1	1	0
Teulon, Seymour	1	1	0
Thomas, John Evan, F.S.A.	1	1	0
Trevelyan, Arthur	1	1	0
Trevelyan, Sir Walter Calverley, Bart.	1	1	0
Trower, G. S.	1	1	0
Tuely, Nathaniel C.	1	1	0
Tueski, Moritz Paul	1	1	0
Tulloch, James	1	1	0
Turner, W. Shearman	1	1	0
Twining, Thomas	1	1	0
Underdown, E. M.	1	1	0
Unwin, George	0	10	0
Vandoni, Le Commandeur Comte de	1	1	0
Vane, Rev. John	1	1	0
Varley, Cornelius	0	10	6
Veitch, James	1	1	0
Vieweg, A. J.	1	1	0
Walker, Sir Edward S.	1	1	0
Watkins, Zachariah	1	1	0
Watney, Norman	1	1	0
Watson, Dr. J. Forbes, M.A.	1	1	0
Watson, Thomas	1	1	0
Webb, Charles Locock	1	1	0
Webb, Henry Bellamy	1	1	0
Webb, John	1	1	0
Webber, Henry	1	1	0
Whetham, Charles	1	1	0
Whitfeld, Henry	1	0	0
Willich, C. M.	1	1	0
Williams, Charles Wye	1	1	0
Williams, Walter	1	1	0
Williams, William	1	1	0
Wilson, G. Fergusson, F.R.S.	1	1	0
Wilson, W. Newton	1	1	0
Winkworth, Thomas	1	1	0
Woodd, Basil Thomas, M.P.	1	1	0
Wood, John	1	1	0
Wood, Vice-Chancellor Sir W. Page	1	1	0
Woodhouse, John Thomas	1	1	0
Woollams, Henry	1	1	0
Woolloton, Charles	1	1	0
Wright, Philip	1	1	0
Wyon, Joseph Shepherd	1	1	0
Wyon, Leonard C.	1	1	0
Yeats, John, LL.D., F.R.G.S.	1	1	0
Zaehnsdorf, Joseph	0	10	6
Zetland the Earl of	1	1	0

FOURTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 11, 1863.

The Fourteenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 11th inst., Sir Thomas Phillips, F.G.S., Chairman of Council, in the chair.

The following candidates were proposed for election as members of the Society :—

Alcock, Thomas, M.P.	Union Club, S.W., and Kingswood Warren, Epsom.
Angel, Moses	1, King-street, Finsbury-square, E.C.
Ashton, John	10, Upper Barnsbury-st., N.
Aste, John	32, Oakley square, N.W.
Barbier, E.	9, St. Leonard's-terrace, Maida-hill, W.
Barker, George	14, Portman-square, W.
Barnard, George F.	4, Essex-court, Temple, E.C., and Cross-deep, Twickenham, S.W.
Barrass, Samuel	29, Upper Park-street, Barnsbury, N.
Barron, Frederick	8, St. Agnes-villas, Bayswater-road, W.
Bayford, Augustus F., LL.D.	52, Upper Bedford-place, W.C.
Clayton, Capt. John Wm.	14, Portman-square, W.
Hartley, T. H.	Earl-street, Horseferry-road, Westminster, S.W.
King, Charles Beeden, C.E.	20, Abingdon-street, Westminster, S.W.
Mussali, Colonel Elias	Sous Directeur au Ministère des Affaires Etrangères de S. A. le Bey de Tunis.

The following Candidates were balloted for and duly elected members of the Society :—

Atkinson, Mrs. William.	47, Gordon-square, W.C.
Dundas, George Hamilton.	13, Pall-mall, S.W.
Fowke, Thomas	11, Mornington-place, Hampstead-road, N.W.
Purdie, James	3, Walbrook-buildings, E.C.
Scott, Alexander Nairn	5, Bury-street, St. James's, S.W.

The Secretary called attention to a Mica Lamp Chimney, a notice of which will be found at page 300.

The Paper read was—

ON AN INTERNATIONAL TRANSIT ROUTE THROUGH NICARAGUA.

By Commander Bedford Pim, R.N.

The object of my paper is to bring as vividly as possible before you, the vast commercial and political importance of the connecting link joining North and South America, and the absolute necessity of opening a new route, in European interests, across it.

At the risk of being thought egotistical, I must mention my claims to be heard on the subject of transit. I may say that I know of no one who has enjoyed more advantages for studying its various bearings upon our wealth and happiness than myself. In the first place, I served during a period of no less than six years in the search for Sir John Franklin, and during that time the question of a north-west passage, that short cut to Cathay, for which we have striven so long and so earnestly, was practically solved by me, as I happened to be the first individual who actually marched from a ship coming from the eastward, the *Resolute*, to a ship coming from the westward, the *Investigator*. This incident in my life naturally gave me a taste for studying the question of "shortest routes," picked up as it were whilst looking at the world from its topmost pinnacle, the North Pole.

Secondly, after my return from the Arctic Regions, and an interval of service in China, I went with my dear friend, the late Mr. Robert Stephenson, to the Isthmus of Suez, and here again had the opportunity of going into the question of transit with perhaps the greatest engineer of the day. My observations are recorded in the Proceedings of the Royal Geographical Society.

The overland route to India, and its important bearing upon the prosperity and happiness of our country, are too well known and understood to need any further comment, but it may not be out of place to observe that, without such a certain and speedy means of access to our Indian empire, that Koh-i-nor of the English crown would have been lost to us during the late mutiny.

Curiously enough, after my return from the Old World Isthmus, I was ordered on service to Central America, the Isthmus of the New World, and I now propose to give some account of my experience in that part of the globe. On the occasion to which I refer, in 1860, I was stationed as senior naval officer on the Atlantic side, but I ought to mention that I had been previously employed in surveying the Pacific sea-board, so that I was familiar with the configuration of the entire coast.

In defining the boundaries of Central America I shall not restrict myself to the narrowest part, commonly called the Isthmus of Panama, but include the entire country, from the first narrowing of the land of North America, at the Isthmus of Tehuantepec, between the 16th and 18th parallel of north latitude, and 94th meridian of west longitude, and its expansion into South America at Darien, in the 7th parallel of north latitude, and 77th west meridian. In this definition I have been guided not by political divisions, but by what appear to be the strict geographical limits of the centre of the New World. Central America, then, lies between the 7th and 18th parallels of north latitude, and the 77th and 94th of west longitude; its least breadth from sea to sea is 27 miles, at lat. 9° N., long. 79° W. The extent of its coast line, counting all its sinuosities, is about 3,000 miles; its length, from end to end, about 1,350 miles; its direction N.W. and S.E.; and its area 300,000 square miles, or about the size of Great Britain and France put together.

It is hardly possible to conceive anything more widely different than the nature of the links joining together the continents of the Old and New Worlds. In the former, we have a broad, flat, low expanse of parched and arid country, rather more than 70 miles across, a complete desert; in the latter, a mountainous surface and very irregular coast line, extending over many hundreds of miles, teeming with animal and vegetable life, and only, at its narrowest part, about half the width of the Old World Isthmus. There is another striking dissimilarity—the one possessing the earliest records of the human race in readable hieroglyphics and crowded with historical associations of the deepest interest to mankind, whilst the other is a comparatively modern addition to the history of the world, with writing still an enigma to science.

Having now given a general idea of Central America, I will draw attention to those points on its surface which are especially interesting as affording facilities for transit, and I think Panama and Nicaragua are the most so. Of course there are other localities of great value and importance, but I shall confine myself in this paper to a description of the two crossings I have mentioned.

Panama claims priority of consideration, not only because it is the narrowest portion of the Isthmus, but because it is the only part of the New World which has been successfully spanned by the iron road. When the colonies threw off the yoke of Spain, about 40 years ago, every one was anxious to have a finger in the golden pie which was then laid before the world, and it is not surprising that all sorts of plans and proposals for joining the two oceans were propounded; nevertheless, nothing was really done until 1848.

In this year, three American merchants, Messrs. Stephens, Aspinwall, and Chauncey, turned their attention to the Isthmus of Panama, with a view to constructing a railway across it. The first of these gentlemen, well-known in the scientific world for his writings on Central America, devoted himself to a preliminary ex-

ploration, and proved the feasibility of the project. Having satisfied himself of this fact, he returned to his partners, and they conjointly entered into a formal contract with the government of New Granada, for the exclusive privilege of constructing a railway across the Isthmus.

The Isthmus of Panama has been successfully spanned by the iron road; the locomotive makes its daily journey from sea to sea, through the virgin forest. I have looked upon some of the greatest engineering works of the day, but I must confess that, when passing backwards and forwards on the Panama railway, standing on the engine to obtain a good view, I have been deeply struck with the evidence, apparent on every side, of the wonderful skill, endurance, and perseverance, necessary for its construction.

The contract was to continue in force for 49 years, but New Granada could take possession of the road in 20 years after completion, upon payment of five million of dollars; in 30 years, upon payment of four million; or, in 40 years, upon payment of two million. Three per cent. was to be paid to New Granada upon all dividends declared. The entire work was to be completed in eight years, and a sum of 120,000 dollars was deposited at its commencement, as security for the fulfilment of the contract, but to be refunded, with interest, on the completion of the road within the given time. All public lands lying on the line of road were to be used gratuitously by the Company, which also received a free gift of 250,000 acres of public land, to be selected from any part of the province of Panama. The two ports, one on the Atlantic and the other on the Pacific, were to be free ports, and the Company had the privilege of establishing such tolls as they might think proper.

The nature of the country through which the line of road had to be carried was such as to strike the hardiest speculator with dismay. The first thirteen miles from Navy Bay was a deep swamp, covered with jungle, reeking with malaria, and abounding with wild beasts, noxious reptiles, and venomous insects. Further on the line ran through a rugged country, over rapid rivers and all sorts of impediments, and after passing the summit, descended rapidly to the Pacific. The climate, also, was sultry, almost beyond any other part of the world, and during the wet season the rain descended in a perfect deluge. Moreover, the resources of the country were found to be *nil*, or nearly so, and consequently everything, especially labour, had to be imported; whilst, to crown all, the ports, or rather roadsteads, at either extremity, were very far from being desirable termini of the railway. Despite all these obstacles the undertaking was commenced, and, under the able superintendence of Colonel George M. Totten, successfully completed. The first blow of, perhaps, one of the boldest and grandest enterprises of modern times, was struck in 1850.

The progress made was as follows:—The first seven miles to Gatun were opened in December, 1851. Twenty-three miles were completed in 1853, and thirty miles were in full operation in 1854; while the entire road was opened for traffic on the 28th January, 1855. The total length of the road is 47 miles 3,020 feet. The total expenditure of the Panama Railway Company amounted to 7,407,553 dollars, or rather more than one-and-a-half million sterling, which is very nearly £32,000 per mile. Very few undertakings have paid better than the Panama Railway. This is not to be wondered at, when it is remembered that the company have a monopoly of transit, and charge most exorbitantly. For example, the passage money is £5 4s. 2d.; children under 12 years, half price; under 6 years, quarter price. There is only one class, so that each passenger has to pay the same. The transit occupies about four hours, the distance is 47½ miles, and the fare, therefore, 2s. 2d. per mile, the most expensive railway travelling in the world; at the same time, the working expenditure is very moderate. The fuel, for instance, is wood, and sufficient for the whole journey is procured for 2½ dollars, or 10s. The charge for freight is on the same high scale as the passenger traffic. Take, for example, live stock. Cattle, by steamers, trains, owner's risk, 25 dollars each, the same exactly as a passenger. Sheep, by passenger train, owner's risk, 12½ dollars each, the same as a child under 12 years of age.

The outlay for the construction of the road was, no doubt, enormous, and arose chiefly from the entire novelty of the work (it being the first real tropical railway), and the extreme paucity of labour. Men were brought to the locality in great numbers from China, India, Africa; and they flocked there from almost every part of Europe, tempted, no doubt, by the very high rate of wages, but they died within a few months after arrival, and but a small portion escaped.

Experience has proved that there is no difficulty in keeping the line in order at a reasonable expense; but, on the contrary, that it continues in better condition than similar works in northern latitudes, where the climate appears to have a more injurious effect than within the tropics.

I have alluded to the enormous cost of the line, and no doubt, working quite in the dark, as the proprietors were, they could not have carried on the undertaking but for the assistance rendered by the Congress of the United States. Messrs. Chauncey, Aspinwall, and Stephens, presented a memorial to that body praying for aid; and the State paper affording it is, perhaps, one of the most remarkable, and, at the same time, instructive documents of modern times. I must make a few extracts from it before proceeding to the second part of my subject, viz., Nicaragua:—

"It becomes the duty of Congress to consider whether the tendency and interests of our commerce, agriculture, and manufactures, the convenience of governing and defending our widely-extended territories on the shores of the Pacific, and of emigration to them, are objects of sufficient importance, when taken in connection with the proposed transport across the Isthmus, of troops, munitions of war, and the mails, to justify the government in giving such aid as may secure the completion of this great work within the time proposed—three years—and place its future management in the hands of *our* citizens. Our commerce with all the countries bordering on the Pacific Ocean is rapidly on the increase, and especially with the South American republics and Mexico, and it is believed that a more frequent and speedy communication with China and other countries of the East will produce a rich harvest.

"Great Britain is principally indebted to her skill in commerce and manufactures for her commercial ascendancy, but she is also indebted in no small degree to her position.

"The construction of the proposed railroad across the Isthmus will not only do away with this advantage over us now possessed by European commerce and navigation, but will turn the tide in our favour.

"We are so much nearer the Isthmus than the ports of Europe, and our means of communication and information will be so frequent and certain, our lines of steamers and coasting vessels so constantly on the alert, and will move with such celerity, that heavy European freighting ships will find it quite impossible to compete with them. If this view of the subject be correct, and we believe it is, the construction of this railroad will throw into *our* warehouses and shipping the entire commerce of the Pacific ocean. Our ports are on the wayside from Europe to the Isthmus of Panama, and our lines of steamers and packet-ships across the Atlantic will come laden with the freights of that channel of trade. The commerce, therefore, from Europe to the East Indies, China, and the west coast of this continent, will be forced to pursue the old route, or fall into our hands.

"Let this railroad be completed, however, and no part of the world will present as great advantages for the successful use of steam in ocean navigation as the Pacific. Coal is found on all its borders, both American and Asiatic, in the greatest quantity and perfection. Its quiet waters

seem to indicate steam as the proper agent to be employed in their navigation. The spirit and genius of the American peoples, and the extent of our territory on the west side of the continent, proclaim clearly enough that we are to become the legitimate heirs of a vast commerce, that shall spread fleets of steam-ships over the bosom of this peaceful ocean.

"When we compare our present condition with what it will be when the proposed railroad shall be completed, and consider the advantages we shall then possess over all competitors for the commerce of the Pacific and the East, we need not be surprised that European capitalists have refused to lend their aid to the accomplishment of an undertaking which will not only deprive them of the decided superiority which they now possess over us in their intercourse with nine-tenths of the world, exclusive of ourselves, but will place us so far ahead in the race for commercial supremacy that they can never overtake us.

"We have already spoken of the commanding position which Great Britain occupies in the commercial world, and we deem it proper to remark still further on the advantages she has derived from it. At an early day she adopted the warehousing system. This enabled her own merchants and those of other countries to place merchandise in bond, for consumption or exportation. It has been equally beneficial to her commerce and manufactures.

"While it has exempted the merchants from paying duties on importations beyond actual consumption, it has enabled them to make up, with home manufacturers and commodities, assorted cargoes for all parts of the world. Foreigners have thus been induced to place immense amounts of merchandise in bond, that they might have the double advantage of consumption or re-exportation.

"The manufacturer has thus been enabled to allow the raw materials necessary to his pursuit to remain in store till required for use, without being burdened with the payment of large sums in duties on importations not immediately wanted. A vast supply has thus been constantly held at the expense of the foreign producer.

"Now if, by the construction of the proposed work we give such a direction to the course of trade as to bring us almost into a central position between Europe and Asia, it seems impossible to resist the conclusion that *our* warehouses must become the great depôts, and *our* cities the marts of modern commerce.

"To guard against imposition from any quarter, and secure the interests of the United States beyond contingency, the Committee have deemed it proper, in the bill submitted herewith, to provide that a *large majority* of the stock of the railroad shall be held by *American* citizens.

"The Committee recommend, therefore, that a grant of two hundred and fifty thousand dollars per annum be made to the memorialists for the purpose of enabling them to complete the work on the conditions stated in their memorial."

From the foregoing it will be apparent that our transatlantic brethren have stolen a march upon us, and successfully secured to themselves the "Gate of the Pacific;" but, nevertheless, they have not yet accomplished their great aim and object, that of monopolising the entire field. Most fortunately for this country, there happens to be another gate. which not only will afford ready access to the trade of the Pacific, but will be a highway of nations in reality, and worthy of such a title. This new route —this transit in European interests—passes through Nicaragua; but before entering upon any description of it, I ought, in the first place, to give some idea of the country through which it will take its course. In doing so I shall have to describe not only the republic itself, but a country now almost part and parcel of it. I allude to Mosquito. With reference to this latter place, I cannot do better than quote from a memorial transmitted from Jamaica to the Board of Trade and Plantations as early as 1773, but which, in every respect, holds good to this day:—

"The climate of the Mosquito shore is milder than any of the West India islands, and the air is more salubrious. The lands are everywhere well watered and fertile, the soil is rich in an uncommon degree, the necessaries and even the luxuries of life present themselves on all sides. The rivers, lagoons, and sea abound in excellent fish, and the coasts afford the greatest number of excellent turtle, both for food and the shell, of any country of equal extent in the world. The cotton-tree, cocoa, and vanilla, flourish spontaneously all over the country. Indigo, too, is a native, and seems to be the same with that of Guatemala, which is accounted the best of any. The sugar-cane here arrives at as great perfection as in any of the islands, and of mahogany and sarsaparilla the quantity imported annually is so great as to render the settlements already an object of no small importance to the commerce of Great Britain, no less than 800,000 feet of the former, and 200,000 lbs. of the latter, exclusive of 10,000 lbs. of tortoise-shell, having been shipped to England in 1769. The banks of the rivers and lagoons are equally well adapted to the growth of logwood as any part of Honduras, and we have reason to think that there is enough to supply all Europe."

I might enlarge at great length on the wonderful fertility of the Mosquito coast and its great importance to England, a value which was clearly appreciated by our ancestors, but which statesmen of the present day have failed to perceive; but I must content myself with simply remarking, that of all parts of the globe, Mosquito takes the first rank as a cotton-growing country. I make no exception, for not only is the soil and climate admirably adapted to the growth of this wonderful plant, as proved by returns issued before commerce came to a stand-still in the Antilles by the emancipation of the negroes, but its proximity to England would render competition as regards its conveyance out of the question; in point of fact, Mosquito is nearer England than New Orleans, and the navigation is incomparably less hazardous; therefore freight and insurance would be less in proportion. But it is useless to dilate any further upon the value and importance of Mosquito, for it is now virtually ceded to Nicaragua, by a treaty the most indefensible in my opinion it was possible to make. There are many glaring instances on record of short-sightedness and wrong, but few to exceed this.

The indomitable natives of this part of America were never subjected by the Spaniards, but, on the contrary, the latter paid tribute to the King of Mosquito to enable them to use the River San Juan without molestation; and, moreover, every effort to form settlements on the coast was sturdily resisted, and the attempt finally abandoned. With the English, on the contrary, the Mosquito Indians have been friendly from time immemorial. They have bravely fought as our allies against the common enemy; they have quartered their flag with ours; they have relied upon our good faith and honour, and finally have been shamefully abandoned. The Mosquito question has been a sort of nightmare to our statesmen, and at last, in an evil hour, the intimidation of the United States became more than our Foreign Secretary could bear, and Mosquito was abandoned—not alone abandoned, the protectorate was not simply given up, but the country itself declared subject to Nicaragua, a gratuitous piece of diplomacy which no one can satisfactorily account for.

But I must now speak of Nicaragua, and return to the transit route I propose to construct through that country for the purpose of practically joining the Atlantic and Pacific in European interests. Nicaragua, then, is one of the five states of Central America, possessing a most fertile territory, a healthy climate, great mineral wealth, and other resources of vast importance to commerce. Nothing but a railway through the heart of the country is wanted to develope all this.

Look at Nicaragua; her geographical position fits her for the commerce of the universe; she is, in reality, the centre of the New World. Mosquito, to say nothing of

its intrinsic worth, offers an Atlantic port; an easy means of reaching this vast wealth, besides being on the highway to all our interests to the westward. But unfortunately the Government has gone out of its way to deprive the country of a vantage ground of vital importance to her commercial welfare. Such conduct, however inexcusable, is not irretrievable. At the proper period resources are brought to light under the dispensations of Providence, which have been long provided, but remain out of sight until circumstances arise which make their application self-evident. This, I am sanguine enough to believe, is the case with the discovery of the new route through Nicaragua, which only requires the requisite English energy to be shortly an accomplished fact.

It is now certain that in the new order of things the giant arms of steam must shortly embrace the whole world; whether this will be accomplished through the Americans, or by us, remains to be seen. We have stretched across the Isthmus of Suez, and with astonishing results pushed steam to the eastward; we must now do the same with regard to the Nicaraguan transit to the westward, or it is quite certain that our transatlantic kinsmen will do so, and then good-bye to Australia, New Zealand, British Columbia, and all connection with that side of the New World. We have often been warned not to trust to our rivals—possibly foes—the danger of their rivalry is best shown by figures:—

The United Kingdom of Great Britain and Ireland numbered, in 1861, 29,313,000; the United States, in 1860, numbered 27,477,090; the slaves, 3,952,801; total, 31,429,891. In the year 1871 the estimated population of Great Britain and Ireland, assuming the rate of increase to be the same as between 1851 and 1861, viz., nearly 6 per cent.—in England it was 12 per cent.—will be 30,989,000, while in the United States the population by 1870 will have attained 42,323,341; and at the same ratio, that is to say, at the rate of 34·6, the average decennial increase per cent. of our kinsmen on the other side of the Atlantic, their population will, in 1890, have reached the enormous amount of 76,677,872; in other words, be just double the number which the census returns of this country will then show. It behoves our statesmen to ponder well over these figures. There is a physical strength in this rivalry which will not allow itself to be ignored. These powerful kinsmen of ours have acquired the exclusive right of transit across Panama; and the least intelligent mind in this country must understand that our trade in the Pacific is thereby jeopardised. My earnest wish is to make this point thoroughly understood in Europe, and that has been the great motive which has induced me to write a book, "The Gate of the Pacific," about it. The monetary interests that England has in having at her command a settled and expeditious transit between home and the Pacific, and thence to British Columbia, Japan, Australia, and New Zealand, it would be impossible to exaggerate. This communication must be independent of the control of the United States, and ought to be "a great highway" in the interests of Europe; and such a route, answering in all respects to these requirements, I believe it has been my good fortune to have discovered. My proposed transit is as follows, namely, to connect the Atlantic and Pacific Oceans, by means of a railway across Central America. Starting from Gorgon Bay, on the Atlantic, lat. 11·30 N., the line would traverse the intervening land as far as the Lake Nicaragua, then skirt the shores of that lake, cross the river Tipitapa, and finally reach the Pacific at the harbour of Realejo—a total distance of 225 miles.

At the completion of the first section, namely, from the Atlantic to the Lake of Nicaragua, a temporary line might be opened for conveying the passengers and goods by steamers now on the Lake of Nicaragua across that body of water, and thence by the macadamised road which has been made to San Juan del Sur, on the Pacific. This temporary line might be opened in the interest of the shareholders in 18 months from the date of commencing the works; in less than four years the great highway itself ought to be completed. The advantages are, that the strict monopoly of the American railway at Panama would be destroyed, and thus would be restored to Europe the commerce which is now slipping away from its merchants.

England would gain considerably in rapidity of communication with Australia, New Zealand, British Columbia, &c., as much as four days to the latter, and at least ten to New Zealand. France would benefit in the same proportion by possessing a safe and speedy means of reaching Mexico from the west; in developing her interests at Tahiti and the South Seas generally, and in extending the great Transatlantic Company's lines of steamers into the Pacific, by which the maritime influence of France would be greatly increased and strengthened, and the Confederate States benefited almost as much as both the European nations put together, for no mercy will be shown them in any transaction with their late partners, the Yankees.

I suggest that an English and French Company be formed, with the view of opening this great highway of the world, and thereby checking the encroachments of the Americans.

The Emperor of the French takes a great interest in Nicaragua and the transit through that country. On the 2nd of this month, I had the honour of a personal interview with his Majesty on this subject, when he expressed himself warmly in favour of such a project, and at once interested himself in its furtherance by very effective means. I may mention that the idea of connecting the two oceans by a transit through Nicaragua was strongly advocated by the Emperor when he was in this country in 1847. He wrote a pamphlet on the subject, and besides spoke at some length at the Institution of Civil Engineers. The following are his own words and are most interesting and forcible:—

"There exists in the new world a state as admirably situated as Constantinople, and we must say, up to the present time, as uselessly occupied—we allude to the state of Nicaragua. As Constantinople is the centre of the ancient world, so is the town of Leon, or rather Massaga, the centre of the new. Like Constantinople, Massaga is situated between two extensive natural harbours, capable of giving shelter to the largest fleets, and safe from attack. The state of Nicaragua can become, better than Constantinople, the necessary route for the great commerce of the world; for it is to the United States the shortest road to China and the East Indies, and for England and the rest of Europe to New Holland, Polynesia, and the whole of the western coast of America. The state of Nicaragua is then destined to attain to an extraordinary degree of prosperity and grandeur, for that which renders its political position more advantageous than that of Constantinople is that the great maritime powers of Europe would witness with pleasure, and not with jealousy, its attainment of a station no less favourable to its industrial interests than to the commerce of the world.

"France, England, Holland, Russia, and the United States, have a great commercial interest in the establishment of a communication between the two oceans, but England has more than the other powers a political interest in the execution of this project. England will see with pleasure Central America become a flourishing and powerful state, which will establish a balance of power by erecting in Spanish America a new centre of active enterprise, powerful enough to give rise to a great feeling of nationality, and to prevent, by backing Mexico, any further encroachment from the north. England will witness with satisfaction the opening of a route which will enable her to communicate more speedily with Oregon, China, and her possessions in New Holland. She will find, in a word, that the advancement of Central America will renovate the declining commerce of Jamaica and the other

English islands in the Antilles, the progressive decay of which will be thereby stopped. It is a happy coincidence that the political and commercial prosperity of the State of Nicaragua is closely connected with the policy of that nation which has the greatest preponderance on the sea."

These words are in themselves most remarkable, but when we consider who is the writer, they assume the most important significance.

It would not be possible, in the limited time at the disposal of the meeting, to discuss this subject in even one-half of its bearings. I am however very desirous, and I think it would be more advantageous to the public generally, that time should be given to others to say something on this most important question. I shall therefore briefly sum up by remarking, that a rapid and independent transit across Central America is of scarcely less consequence to us than the one by the Isthmus of Suez; but that we have allowed our commercial rivals to shut the gate in our face, and nothing but the violent outbreak in the United States has kept our Pacific commerce from falling into their hands; again, our foreign policy in the New World is nothing to boast of, indeed it may be said with truth, that a lamentable amount of ignorance has been displayed in that quarter; nevertheless, though these errors are quite inexcusable, there is still a chance of redeeming them.

I trust very soon to revisit the scene of the proposed great International Highway, with the object of bringing the necessary details for its construction before my fellow-countrymen in a practical shape, and in fulfilling my laborious task I ask you all to wish me God speed.

DISCUSSION.

The Chairman, in inviting discussion upon the paper, said he believed they could hardly have a subject of more importance to consider than that which had now been brought before them, and he could not help thinking the attention of this country has been too little directed of late years to the serious fact that there was a bar across the Isthmus of Panama which obstructed the commerce of this country. It was remarkable how great had been the interest felt on this subject in former times. They all, doubtless, knew that the object with which Columbus left the ports of Old Spain was to find a free passage to India by the Western Ocean. At that time the world had no knowledge of the existence of the great Western Continent, and Columbus, when he left Spain, did not dream of discovering such a territory, but merely sought to find a clear passage to India. Two centuries after Columbus the attention of this and other countries was again directed to the subject of a passage across the isthmus; and all present were, doubtless, well acquainted with the melancholy history of the Darien Company, by whom an attempt was made to find a passage across that isthmus in the year 1695. It was unnecessary to trouble them with the history of that company; those who took sufficient interest in it would find the particulars in Dalrymple's "Memoirs of Great Britain," wherein the Scotch view of it was presented, and the English view of it was given in Macaulay's "History of England." That scheme was proposed by an extraordinary man—by no less a person than William Pattison, a Scotchman, the founder of the Bank of England. The jealousy of England towards Scotland—the union not having then taken place—the dread that Scotland should become too rich at the expense of England; jealousy on the part of Spain in respect of territory which Spain claimed, and perhaps rightly claimed, as her own; jealousy, also, on the part of Holland with reference to the possible interference with the commerce of that country, roused the able monarch then on the throne of England to take a part adverse to the Darien company, and the result was its entire ruin. They now lived in different times. They lived in times when the importance of direct communication with the Pacific was infinitely multiplied. Those great colonies at the antipodes, which were now growing up or had already arrived at a high position both as to population and commerce, rendered the object of a direct communication with this country one of growing importance. The same might be said of India, and he thought they could have no doubt that the country which possessed what Captain Pim called the gate of the Pacific, would possess an advantage which England ought to secure for herself. Captain Pim had styled the passage of the Isthmus, "The gate of the Pacific;" it was somewhat remarkable that the former promoters of the scheme designated it the "Door of the sea and the key of the universe." These were figurative terms, but they showed the importance with which the subject was regarded by men who had carefully considered it. Captain Pim had called attention to two very important considerations; one was that at the present time the communication from the Atlantic to the Pacific was in the hands of a country who, to say the least, was our rival, and would not be likely to use any power it possessed in a forbearing spirit towards this country. He had also alluded to another fact which was worthy of consideration, viz., the interest that had been taken in this question by the present Emperor of the French when in this country many years ago. He thought this fact well worthy of their attention, more especially when they looked to what that monarch was now doing in Egypt. Let them remember that he had an important scheme in progress for securing communication with India, to be used, it might be, if the canal could ever be completed, probably not to the benefit of England. Let them remember that nearly twenty years ago Prince Louis Napoleon placed before the world, when in this country, the importance of this communication; and let them also remember that at this moment there was a French army in Mexico. These were matters calling for serious consideration on the part of Englishmen.

Mr. Cockburn Curtis said that this subject, as Captain Pim had stated, was brought before the Institution of Civil Engineers some years ago, when Prince Louis Napoleon spoke in favour of it, and on that occasion, he (Mr. Curtis) was asked to give his opinion on the question. He would say in the first place that great anxiety was manifested on the part of the then Prince—now Emperor—to secure generally to the world the benefit of this very important communication between the two great oceans. The mode in which he proposed to effect it was by means of a navigable canal. They did not at that period consider railroads so available as they did at the present day, but it had since been found that railways could be made much cheaper than canals, and that even lines in such exceptional districts as the one under consideration might be made to return a good dividend to the shareholders. Some of the railways in England had been constructed at a cost of as much as £70,000 per mile, and the average of all the lines was between £36,000 and £40,000 per mile, as against £4,000 to £5,000 at which railways had been constructed in Spain; and he apprehended in a new country like that now spoken of, where a large portion of the land would be granted, and other facilities given to the persons interested, a railway might probably be made at considerable less cost even than that. On a former occasion he had spoken of the difficulties of entering the ports on the Pacific side, owing to the heavy storms on those shores, rendering it difficult for any sailing vessel—even for a well appointed man-of-war—to bear against such gales. This was in 1847, but since then great advances had been made in steam navigation, and having crossed the Atlantic in some of the splendid ships now running, he ventured to say these difficulties could now easily be surmounted. It was a question of artificial power against the power of nature, and a steam vessel, instead of having to get inshore, where she was exposed to the heavy gales coming off shore, could select her own route. As far as his own

knowledge of the district generally went, he thought the provisional route proposed by Captain Pim was a very available one, partly by railway, partly by navigation, and partly by road, and it had the advantage of opening up the communication in the shortest time. The permanent route was to be entirely by railroad from Gorgon Bay to Realejo. The latter possessed the advantages of access to an excellent port, whilst they found that the port of Greytown was rapidly filling up. From surveys he had seen of Gorgon Bay, he considered it far more available than Greytown. He thought that the route now pointed out was decidedly deserving of careful examination, and he most heartily wished Captain Pim God speed in his undertaking.

Mr. CHARLES WHITE (Consul-General for Nicaragua), responding to the call of the Chairman, said as his friend Captain Pim was about to engage in this investigation, he could not do less than wish him a successful voyage. Two years ago, he had the pleasure of travelling through Nicaragua, and he was connected by business and friendship with many of the inhabitants of that country. He had traversed the Isthmus of Panama in three different places, and having travelled upon the Panama railway, he could confirm what Captain Pim had stated, that it was one of the most extraordinary works he had ever seen. He could not say how many thousand people fell victims to the opening of that communication. It was a most unhealthy climate to Europeans, and was not inappropriately called the Englishman's grave. His trip through the isthmus was a most rapid one. He had bathed in the morning in the waters of the Pacific, and in the afternoon of the same day in those of the Atlantic. Having described a journey from Greytown up the San Juan river, and pointed out the obstacles to the passage caused by the numerous rapids, and having referred to the difficulties of navigation from the filling up of the harbour of Greytown, Mr. White proceeded to express his opinion very strongly in favour of Captain Pim's proposed line of railway from Realejo to Gorgon Bay, in which he believed there were no engineering difficulties to be encountered. After the proposed railway had reached San Miguelito, Captain Pim proposed that it should pass through some of the richest provinces of the country, in which there were valuable gold mines, and immense tracts of prairies for cattle. Hides which were formerly sent to America were now sent in large quantities to this country. Mr. White also mentioned that in 1859 he received seventeen tons of ore from that district, which contained gold and silver in about equal proportions, and he sold that amount of ore for a gross sum of £1,200. On making inquiries relative to further supplies of the same description of ore, he found that the mine had been destroyed by the natives having knocked down the supporting pillars during the absence of the owner in Europe. He could state from his own personal knowledge, that Senor Martinez, who had been recently re-elected President of the republic of Nicaragua, had viewed Captain Pim's project with great favour, and was disposed to give every facility in his power towards carrying it out. In conclusion, he stated that there were no difficulties in Nicaragua to be compared with those of the Panama Railway. It was a comparatively flat country, and travelling through it by railway would be a very pleasant journey. He regretted that circumstances would not allow him to accompany Captain Pim in the voyage of exploration he was about to undertake, but he heartily wished that a successful result might reward that gentleman's enterprise.

The Rev. P. LA TROBE had some knowledge of this country and people, through his connection as secretary with the only society that had established missionary stations on that coast, and his attention was directed to it many years ago by a somewhat singular circumstance. A German prince of great wealth and public spirit entertained the idea of colonising that portion of Central America, and applied to him for such information and aid as he was able to give. He (Mr. La Trobe) communicated with Sir George Grey, then Under Secretary for the Colonies, and also with the agent at Honduras, and the result of the inquiries at that time was such that the philanthropic prince was strongly recommended not to throw away his money upon the project he had entertained. In 1840, however, the first missionary station was established there, and since that time four other stations had been added, and there were between five hundred and six hundred of the natives connected with those stations. From all the accounts he had received, it appeared that the climate was very favourable to European constitutions, much more so than any of the West India Islands. They had not lost a missionary during the last fourteen years from pestilential fever. Although only a small portion of the country, reclaimed from the primeval forests along the coast, had as yet been cultivated, abundant evidences were afforded of the richness and value of its native productions, particularly cocoa, the quality of which was not surpassed in any part of the world, and there was great reason to believe that by education and civilisation, the people would be raised in the scale of being. They had looked with some jealousy upon the encroachment of the Nicaraguan republic upon the Musquito country. The king of the latter was not a very enlightened man, and was addicted to the vice which too often followed the advent of European settlers—intoxication. He had no doubt that a colony of well-conducted Europeans would be able to effect great things in the cultivation of a country so rich in all its products as the one under discussion. In reply to an inquiry from the chairman, Mr. La Trobe stated that the missionaries were all Europeans, and mostly Germans, some of whom had lived in the West Indies, and spoke more favourably of the climate of this part of Central America than of that of the West India Islands.

Dr. BERTHOLD SEEMANN said his acquaintance with the country under consideration did not extend much beyond the coast. He accompanied Captain Pim in his survey in H.M.S. *Herald*, and he could confirm the statement of that gentleman with respect to the harbours mentioned being admirably suited to the purposes intended. He looked upon this project with great hope. It was one of vast importance to British Columbia, Vancouver's Island, and the whole of the eastern coast of Australia, and he believed it would be most valuable in a commercial point of view. The only question was as to the nature of the 60 or 70 miles which Captain Pim had undertaken to explore, but from all the information he had obtained from the Indians, he had no doubt it was a comparatively flat country, without any high mountains that would be an obstruction to a railway. He had no doubt whatever either as to the practicability or the ultimate success of the undertaking. As far as the natural products of the country were concerned, he had seen the finest samples of sarsaparilla and cocoa, which would rank with those productions in any other part of the world. He could bear testimony to the favourable character of the climate for the production of cotton for a vast extent of land along the coast, from whence they might look for a quality equal to the best Sea Island of America; and the fact that it was nearer to England than New Orleans, was one deserving of particular notice.

Mr. CHARLES WHITE said he had omitted to mention one very important production of the country, viz., india-rubber, of which there was an immense supply. He had received from Greytown extensive consignments of that material which now so largely entered into the manufactures of this country. He believed Captain Pim might repay the expenses of his exploration by employing the natives to tap the trees for india-rubber; and if that operation were properly performed, they would yield a continuous supply for many years.

Mr. PARKE PITTAR, although he had no personal acquaintance with the country in question, wished to offer one or two observations on this subject without reference

to the locality itself. He had read Captain Pim's work with an interest amounting almost to enthusiasm, and every one must agree that the subject could not have been treated in a more masterly manner. He (Mr. Pittar) addressed them both as a merchant and as a traveller. The tone of feeling that evening had been all one way; he therefore rose for the purpose of introducing a little pleasant opposition, and he knew Captain Pim would be rejoiced to answer any suggestions that might be offered. He objected *in toto* to a railway across the isthmus in question; he thought a canal would be preferable in many points of view. There was at the present time one railway across the Isthmus of Panama upon which, however, the question was raised that it was entirely in the hands of America. Having himself crossed the Isthmus of Suez eleven times, he was practically acquainted with the inconveniences of unshipping and re-shipping merchandise, by which there was not only great delay, but damage to many articles by breakage. With regard to passengers, it was a great nuisance to leave one ship, then to cross the desert, and embark in another ship on the other side of the isthmus. With a canal there would be no necessity for transhipment either of passengers or cargo, and he thought such a means of transit would command the great bulk of passengers and merchandise. In England they knew that a railway with two or three breaks stood no chance with a direct line. Therefore, he thought if Captain Pim in his survey could find out a route through which a canal could be carried, it would be preferable to the railway he had suggested. He threw out the hint as one which in his opinion was worthy of consideration.

Mr. Wm. Hawes believed that all the discussion that had taken place on this subject confirmed the opinion that cutting a canal of sufficient capacity for the large ships engaged in the colonial trade was quite impracticable, whether considered with reference to the time required to do it or its cost. His objection to this paper, however, was based upon entirely different grounds. It was true they had an overland communication with India, but that was confined to passengers of the highest class, and to freights of large value and small bulk. The travellers by that route were those to whom time was of more consideration than money; but as between this country and Australia, they would find that but few passengers, and but a small quantity of goods, could incur so extravagant a cost of transit. Independently of that, they had no facts to guide them upon the question whether this route would or would not be an improvement upon the present one. They were aware that large companies had been formed, having extensive interests, which had taken the best means of ascertaining the advantages and disadvantages of having communication with our Australian colonies direct by Panama, or by some other passage across the Isthmus, in preference to the sea-passage by the Cape of Good Hope or Cape Horn. The results of all the investigations that had been made had been laid before parliament and the public in various reports, and it was shown that although in the outward journey they gained some advantage, yet it was lost on the return route. They might reach Australia within a given time, but the question was whether they could accomplish the return voyage with the same advantage. Taking the average outward and homeward voyage, there appeared to be only a few days' difference, even under the most favourable circumstances, by the Isthmus route as compared with that round Cape Horn. For Sydney, by the American route, the average time was 111 days; by the European route, 118 days 6 hours; by the overland English route, 112 days; and by the sea route, 118 days: so that the gain in time amounted to very little by the Panama route. What were the other difficulties? They were told of the salubrity of the climate and the abundant produce of the country; but what had the passengers passing through this little bit of country to do with that? Those who knew the country generally had stated that it was not suited to European constitutions, and that the difficulties attendant upon leaving a vessel, passing over the isthmus by another means of conveyance, and waiting for another vessel on the other side of the isthmus, were such as to deter anybody from going by that route. He had had no personal experience of either route, but he thought no one would take this direct route with the risks, dangers, and difficulties of being transhipped, with the chances as to the due arrival of the ship on the other side of the isthmus to continue the journey, and with anything but good accommodation during the detentions. No one would risk all these difficulties for the sake of saving a few hours in a voyage like that. Then they were told that one great advantage of the proposed route was the remarkable cheapness of construction of the railway, and figures had been quoted to show that, as compared with England, the expense of this railway would be very trifling indeed. It was a pity in a discussion like this, to make exaggerated statements. They had been told that the railways in this country cost something like £70,000 per mile. Every one knew that was a great exaggeration.

Mr. Curtis mentioned that as the cost of one railway.

Mr. Hawes—One might have cost £100,000 per mile, but who would dream of quoting that as an instance of the cost of railways generally? The aggregate cost of the railways, in round numbers, had been about 330 millions, and the number of miles being about 10,000, made £33,000 per mile the average cost of the whole railway construction. There had been quoted to them this evening the opinions of certainly one of the greatest men of the day, the Emperor Napoleon. His views on many subjects were very valuable, but it was a question whether his opinions, now that he was emperor, were similar to those which he stated in the discussion which took place before the Institution of Civil Engineers many years ago. He did not think the Emperor would repeat the statements now which he made on that occasion. But supposing he would do so, what did that amount to? It amounted to this—that if the statements made of the facilities of this proposed route were true—if that was the great natural highway from Europe to Australia, let them make it as perfect as they could, so as to be available to every European country. But they had yet to prove this; they had yet to prove the practicability of the route, an economy in time and the greater facilities for the transport of merchandise; they had yet to prove the whole case. But beyond all, as an inducement to take up this project, they were told that the Government had greatly neglected our natural interests, and had grossly misused this state of Mosquito. It was at one time a national question that we should have influence and interest in that tract of country as opposed to the Spaniards, who held the whole of South America. We then held the Mosquito territory as a barrier against the further aggressions of Spain, but as time went on, Spain lost her influence in that quarter, and England had no longer the same interest in its occupation, and gave up a country which we had no claim to, and which had been an enormous expense to us without any adequate return being derived from it. Therefore, to say that the Government, in their foreign policy, were neglectful of our interests in yielding up a country to its legitimate owners and occupiers was, he thought, an imperfect view of the question.

Captain Pim said he had not complained that the country was given up to the rightful occupiers and owners; but that it should be given up to a Roman Catholic country, which was a most iniquitous proceeding.

Mr. Hawes would not raise any religious debate upon this question; that had nothing to do with the subject under discussion. He thought neither the paper nor the remarks of those who had spoken upon it had established the facts laid down; they had failed to show that there would be any adequate saving of time or money, or any increased facilities upon which the success and value of the plan must depend.

Mr. J. H. MURCHISON said the importance of the question brought before them this evening could not be overrated, whether they regarded it in a political or commercial point of view. Indeed, in a country like England, based as its high position was upon the unlimited extent and great value of its trading operations in all parts of the globe, it was impossible to enter into a discussion involving our great commercial interests without also considering questions of great public policy. They had been told by the gentleman who last addressed them that the position laid down this evening had not been established. Perhaps he had not heard of the speech of the Colonial Secretary, the Duke of Newcastle, last session, when he informed the House of Lords, and, through the House of Lords, the people of this country, that he had been unable to communicate with the governor of British Columbia for six weeks, for fear of the dispatches falling into the hands of the Americans, in case of war breaking out between this country and the United States. He thought if no other fact were named to substantiate the views of Captain Pim it was this—England ought not to be in a position that she could not communicate with her own dependencies except at the mercy of a country who might choose to go to war with her. Mr. Hawes had told them that this route was unnecessary. Was that the opinion of the colonies themselves? They had in this country, at the present moment, only recently arrived, a member of the government of New Zealand, with powers to offer to any company prepared to carry out a route by the isthmus, a subsidy of £30,000 per annum, and that from their youngest colony—New Zealand. There was also in this country an agent from the colony of New South Wales, prepared to give a subsidy of £50,000 per annum to any company carrying out this route. There was no doubt that political considerations of the highest importance to this country were involved in this question, and if Mr. Hawes did not think the colonists required it, they themselves, who might be presumed to be the best judges of their own interests, were prepared to sacrifice a considerable annual subsidy to effect this object. Mr. Hawes had told them also that the voyage round Cape Horn occupied only 118 days. He (Mr. Murchison) believed 160 days was more like the time. But the great question involved here was this:—There was now a railway across the isthmus; was that sufficient? Even putting out of consideration all political considerations—even putting out of the question that we were in the hands of the Americans in case of dispute with them—he would ask, Did the Panama Railway meet all our requirements? Although it was only 47½ miles long it took four hours and a half to cross the isthmus, and the fares were most exorbitant, as stated by Captain Pim. He believed, moreover, the Panama Railway went through a district containing no towns, but only hamlets with a very small population; that the ports at each end of the railway were most incommodious and unsafe. He believed that passengers had to embark and disembark at the risk of their lives. But there was one point which affected Englishmen more than any other—that was, that unless a passenger had a direct through-ticket from New York, he was detained ten or twelve days in Panama, while the American people were not subjected to that inconvenience. He met a gentleman recently returned from British Columbia, who told him he was detained twelve days in Panama. He would therefore ask whether the inconveniences which existed as to the Panama railway — irrespective of political considerations—did not show the necessity of looking about for some other means of getting across the isthmus of Central America? They had now to look to the route proposed by Captain Pim. It was a longer line of railway, but he believed it would not take a longer time to cross, and there was every promise that it would be a remunerative undertaking. But what was more important, the ports of Gorgon Bay and Realejo were of the best and most commodious description. Passengers could land direct from the steamers and enter the train, and the same facilities existed for re-embarkation on the other side of the isthmus. But another point was the question of climate. They had heard from the reverend gentleman who had addressed them from his own personal experience, that the climate was not objectionable. Then as to the question of population; whilst that through which the Panama Railway ran was very small indeed, he believed the population through which the proposed line would pass, was nearly three millions. He would ask whether these facts were not of great importance in considering the necessity, commercially, of establishing such a route, independent of all special interests, free and open to the whole world? Mr. Hawes had moreover told them that they should attach but little importance to the opinions which the Emperor of France had expressed on this subject, that the Emperor was a different man now to what he was when he uttered those sentiments in this country. However much he (Mr. Murchison) might differ from the Emperor on political matters, he did not think there were any just grounds for making such a statement. Moreover, Captain Pim had told them that he had lately had an interview with his Majesty, and so far from having altered his opinion, he entered warmly into the project, and promised to give it his best support. One gentleman had advocated the construction of a canal instead of a railroad. The ancient Egyptians endeavoured to carry a canal between the Red Sea and the Mediterranean. There was a great doubt whether it was ever made. but even if it was, the best authorities informed them that it took a century to construct, and he believed that it was difficult now to find a trace of it. They were also told that the Greeks and Romans contemplated a canal across the Isthmus of Corinth; but it was a mere intention, for the difficulties were so great that it was never carried out. But while they were told of so many intentions to open canals, they had the great fact before them that there *was* a railway communication between the two great seas across Panama; and, notwithstanding the great difficulties that railway had to contend with they found it was paying large dividends to its proprietors. The last dividend was 16 per cent.; the next was expected to be 20 per cent.; consequently, whatever might have been the difficulties and the cost of that line, it paid the shareholders very handsomely. But another objection to canals was this—that whilst they could open a railway in sections, as it was completed, they could not open a canal till the last foot of earth was excavated. It would probably take ten years to construct a canal, and the estimate of the cost varied from six millions up to 30 millions. It was not likely, therefore, that a project for a canal would meet with support from capitalists. There appeared to be some misunderstanding in the meeting as to the average cost of the railways of this country. He believed it would be found to be about £32,000 per mile. Captain Pim, at the commencement of his paper, modestly alluded to the distinguished services he had rendered in the high profession to which he belonged, and with which services those who took an interest in the events of the country must be familiar. He believed Captain Pim was yet destined to confer still greater benefits on this country; and he was quite sure anyone who had read the work he had lately published would be convinced of this—that any undertaking he lent himself to, and any great enterprise he took in hand, would be carried out with indomitable perseverance and undaunted courage. He believed, although the services which Captain Pim had already rendered to the country would hand down his name with fame to posterity, the services he would yet perform would show him to be one of the greatest benefactors of his kind. He thought the words of the poet (Moore) were not inapplicable to the subject before them, and perhaps not inapplicable to the fame which he believed would be awarded to the name of Bedford Pim:—

Who that surveys this span of earth we press,
This speck of life in time's great wilderness,
This narrow isthmus 'twixt two boundless seas,
The past, the future, two eternities!—
Would sully the bright spot or leave it bare,
When he might build him a proud temple there,
A name, that long shall hallow all its space,
And be each purer soul's high resting-place!

The Chairman, in proposing a vote of thanks to Capt. Pim for his paper, remarked that he was sure his friend Mr. Hawes would agree that, although he questioned some of the arguments of the paper, the subject they had discussed was a very important one. He still thought, after all that had been said, its importance could hardly be overrated. Whether the difficulties could be surmounted was another question; he had great confidence that they could, and that the scheme when carried out would be highly beneficial. It was one of the advantages of these meetings that they brought out the adverse opinions upon all the questions that came before them. It was desirable never to close their proceedings with merely hearing one side of the question. It was desirable that the subjects should be fairly criticised, not in a hostile spirit, but in a critical temper—that all the difficulties and objections should be pointed out, and, as far as possible, grappled with. That seemed to have been done in the present instance, and he would now bring the proceedings to a close by asking the meeting to return its thanks to Captain Pim for his very interesting and able paper. Whatever might eventually become of the great question, they would all feel that Captain Pim had not been uselessly engaged in bringing before his countrymen the benefits which he believed would result from the execution of this work.

The vote of thanks having been passed,

Captain Pim, in acknowledging the compliment, remarked that the observations of Mr. Hawes, by whom the only objections to his scheme had been raised, had had been so fully and so ably replied to by Mr. Murchison that nothing had been left for him to add. His motto was "Deeds, not words." In bringing this subject before the attention of the public he anticipated much opposition and the having many objections to meet. Lieut. Waghorn surmounted enormous difficulties, before he introduced the great blessing to the Anglo-Saxon race of the overland route to India; and he could not expect but that he (Capt. Pim) would have many difficulties to encounter. He was becoming almost desponding when no one got up to speak against his scheme, from a fear that there was nothing in it, but after the remarks of Mr. Hawes he took heart, especially as they had elicited the reply of Mr. Murchison, which he (Capt. Pim) thought had completely demolished Mr. Hawes's objections.

The Secretary announced that on Wednesday evening next, the 18th March, a paper by Mr. Charles B. King, "On the Suppression and Extinction of Fires," would be read. On this evening the Earl of Caithness will preside.

MICA LAMP CHIMNIES.

M. del Campo, a corresponding member of the Society in Holland, states that an application of mica to lamp chimnies has attracted his attention on the Continent. The advantages of these chimnies are that they neither crack from a sudden change of temperature, nor break from falling down, which is an important thing in large buildings like manufactories, churches, &c. These chimnies have come into general use on the Continent, but as he has not met with them in this country, he has sent one of them to the Society, in order that those members who take an interest in the matter may make themselves acquainted with it.

Home Correspondence.

THE PATENT LAWS.

Sir,—It cannot be disputed that the patent laws are most unsatisfactory, and require a thorough revision. At present the opponents to the granting of patents point with much force to the great proportion of patents being of a most frivolous character, and therefore advise their entire abolition. Such a measure would not only be unjust to the true original inventor, but would foster a system of secrecy and misrepresentation.

It must be admitted that the publication of specifications lends material aid to the inventor in informing him of the progress made in any particular department.

The idea of refusing a patent on the ground of its being a monopoly is inconsistent with the truth. Certainly that which had no previous existence cannot deprive any one of any right already possessed. In English law a monopoly is defined to be "an allowance of the Crown, by grant, commission, or otherwise to any person or persons for the sole buying, selling, making, working or using of any thing, by which other persons are restrained of any freedom or liberty that they had before, or hindered in their lawful trade." No original invention can possibly be deemed a monopoly. It is, in fine calling into existence some effect, by the aid of chemistry or mechanism, or their combination, which was not previously known. No patent should be granted except it came strictly under that category.

The accidental discovery of a diamond or a nugget of gold gives the finder an actual property. Anyone who had gone over the same ground might have found the diamond or the gold. The inventor, however, requires to be fitted, by a knowledge of his subject, obtained by education or experience, before he can successfully remedy defects, or meet public requirements. No one is forced to use an invention; nor, as a rule, is it used except it offers some positive advantage over the method previously known. It is, therefore, not sufficient to merely invent, but the invention must be made of public utility. He whose education and talents enable him to devote his time to benefit others, surely cannot be denied compensation for so doing. If that were to be admitted, no profession, art, or calling would be exempt. Mental property should, of all others, be amply protected. If not, where is the inducement to improve? There no doubt will be exceptional cases where men of talent can afford to give their services to the world without compensation. These cases must necessarily be the exception to the rule. It would be quite as consistent to make the medical man, the clergyman, or the lawyer, give their intellectual acquirements without reward, as the inventor. Free trade in mind is an abstract idea—a mere myth; in fine, it is incompatible with our intellectual capacities. Intellectually, men are not equal.

Free trade in thought—if such were practicable—would destroy that ambition and zeal which prompts the man of superior genius and mental capacity to devote himself to the task of surpassing all previous efforts. Imagine the work of a sculptor or painter—produced after years of toil—which for its excellence commanded universal admiration, being copied by any one, and sold for the mere price of the mechanical imitation!

Invention, which improves and cheapens the production of things essential to the wants and requirements of civilized society, should be rewarded. Otherwise, why should there be protection to any description of property?

It is the intellectual operations of the mind in one channel or another which alone has established the grades of society. Destroy all species of protection, and adopt the ultra-democratic idea—that free trade should be carried to these extreme limits—why then should one have protection for any species of property? On this principle the pickpocket takes your watch because he has not one of his own. Those who were lately convicted

of making Bank of England notes, no doubt thought themselves free tradesmen in this sense. It is a singular fact, that the most noisy opponents to patents are those who are desirous of, but are now prevented from, appropriating to themselves the patent inventions of others. Why do not these invent some method of arriving at the same results? If not, why should they object to pay for that which they of their own free will use, when it is not imperative that they should do so? Surely, that which is worth having is worth paying for. That the user is benefited by the adoption of any particular invention is self-evident, or why does he use it? In all our relations of life from the most trivial to the most important, do we not pay for benefits received?

The abuse to which the present system of granting patents is carried, may be illustrated by a case which recently came under my notice:—A person with whom I was in conversation on the subject of steel shirt collars, he wearing one, complained how stiff and inconvenient it was, though in other respects answering the purpose, when I jocosely said, "Why do you not get some of Dr. Cattell's refined gutta percha, or add magnesia to a preparation of gutta percha; it would make a capital collar?" This person, without ever informing me of his intention, goes to a manager of a patent agency company, states *his* discovery, pays £9, and the provisional specification actually includes not only Dr. Cattell's preparation, but the addition of magnesia! Had I said arsenic, calomel, or cream cheese, I verily believe it would have formed part of the specification. It is the monstrous multiplication of such cases which has brought patents into disfavour, ridicule, and contempt, with those who summarily class all under the same denomination. That such a system demands a thorough reform no rational person will question.

How is this to be accomplished?

The only method to meet such cases is to have a competent board of examiners, before whom the applicant should submit his claim for a patent. If found to be an original idea, or combination of ideas, the protection asked should be granted. If not, it should be refused—the reasons for such refusal being fully stated—so that the applicant could have the opportunity of amending his former claim, and if, when amended, it should be found to demand the granting of a patent, this should be allowed accordingly. It is desired by some, that if refused, the applicant should have the option of taking out a patent independently of the adverse decision arrived at by the examiners. Such a course would be like a medical student being able to obtain his diploma independently of the examiners, after they had found him incompetent to receive it. The more rigid and searching the investigation prior to the granting of letters patent, the more valuable the patent when granted.

To point out the benefits which the public derive from inventions would be to recapitulate the introduction into this country of gas, steamships, the locomotive, electric telegraphs, improvements in nearly every department of industry, by which the few millions of England's population are enabled to supply the world; without which the production of all her operatives would not be sufficient for her own demands. In fine, invention has rendered this empire the greatest and wealthiest of the nations. Who then will, with honesty, deny to the true original inventor the only recompense—a limited protection—for his labour and time in the accomplishment of such mighty national benefits.

The whole system attendant on the obtaining of a patent, as at present practised, is a fraud and a deception on the poor inventor. There are those who make a regular business of speculating on his necessities. Many of the most valuable inventions are lost to the owner from his incapacity to meet the present enormous Government fees. There are but very few patent agents or attorneys adequate to the responsible duty they have assumed. The consequence is, that when the specification is brought before a legal tribunal, it is found defective, and very often not in accordance with the ideas or intentions of the inventor. These and many more defects, consequent on the present state of the law, would be effectually remedied if a preliminary tribunal were to be instituted; no application to pass or receive a patent which did not fulfil all the conditions essential as constituting an original and true invention—not a mere application of another's idea, or the application of an existing method or mechanical arrangement to another purpose, or coloured alteration, made in ambiguous terms, so as to mislead and confuse. Such, unfortunately, constitute too great a proportion of the patents now granted. In a word, let us have a good, strong, substantial patent, or none at all. I am, &c.,

ROBT. H. COLLYER, M.D., F.C.S., &c.

Beta House, Alpha-road, N.W., Feb. 21, 1863.

Sir,—Having had many opportunities of observing the perplexities and annoyances to which patentees are exposed, I take the liberty, with your kind permission, of pointing out some of the defects of the system, with a view to their removal, so that the meritorious inventor may be effectually protected from the machinations of unprincipled imitators.

The process of obtaining a patent is so costly as to preclude the possibility of a poor man securing the benefit of his invention, however important it may be to the public, for he must either abandon the project or sell the secret for a trifle to a speculator. Such circumstances have a depressing influence on the growing genius of the age, and press hardly on the poor skilful mechanic.

When a patent is obtained for a thing in general use, the inventor is surrounded by a host of imitators, who, under colour of some trivial alteration in the means, arrive at the same result. Others, more daring, copy still more closely, under the plea of the idea not being new; thus the patentee has, single-handed, to encounter a crowd of tricky assailants, who attack him at all points, till at last he is obliged to seek refuge in a court of law; and when he has done so he finds that he has jumped out of the frying-pan into the fire, and all to defend a right granted by no less a power than the Crown itself. To obviate all this I venture to propose:—That the cost of letters patent be reduced to a scale approximating to the charges for the registration of articles of utility; that, on applying for a patent, the inventor set forth all particulars in a specification, and if the applicant's claim to originality be established to the satisfaction of the experts attached to the Patent Office, public announcement be made by advertisement that such patent has been applied for; and that if the right to such patent be not disputed or challenged within one, two, or three months the same shall be granted, and that after that time no objection shall be admissible, nor shall proof of the existence of an idea tending to the same or to a similar end, vitiate the patent. It is the duty of the authorities of the Patent Office to satisfy themselves as to the originality of the invention for which protection is sought—for many may really believe they are the inventors of something that may have been known for years—and, on the other hand, it is equally their duty to protect the rights of those whose claims are recognised, or should be, by the letters patent themselves. In short what is wanted is, that the patent commissioners should be responsible both for granting patents and protecting them. At present the Patent Office is like a doctor who pockets the fee without benefiting the patient. All persons infringing patent rights should be amenable to a summary process, as under the Registration Acts.

There may be some points open to amendment and many details to supply. The above is but the rough outline of a plan calculated, in my humble opinion, to remove many of the obstacles which, at the present time, impede the progress of invention. I am, &c.,

Feb. 1863. GEORGE ELLIS.

THE COTTON QUESTION.

Sir,—At the Society's meeting on the 25th February, Mr. H. Ashworth, when speaking of Indian cotton having been produced on the plantations for three farthings per pound, threw discredit on the truth of the facts, and asked, what vegetable material was there, with the exception of straw, that could be produced for this price. I, in answer, beg to observe that there is a vegetable product and a cotton capable of being produced at less than three farthings per pound, that is to say, £5 per ton, and the name of this article is the Bulbous cotton of South Africa. For further particulars as to the quality, I beg to refer to a communication on the subject by the well-known scientific chemist, Mr. Keates, of Chatham-place, which appeared in the *Journal* at page 48 of the present volume.

I am, &c.,

THOMAS G. GHISLIN.

72, Hatton-garden, March 4th, 1863.

Proceedings of Institutions.

Dudley Mechanics' Institution. — The fifteenth annual meeting of the members of this Institute took place on Friday evening, the 30th January. In the absence of the President (Mr. F. Smith), the chair was occupied by Mr. John Finch. The report was read by Mr. Joseph Stokes, honorary secretary. It stated that in no one department had there been any retrogression, but, on the contrary, steady progress had characterised the past year. The number of members had considerably increased. Last year the list contained 200, this year the members were 240, showing an increase of 40. The report concluded with the following reference to the institute now in course of erection:—"The 'new building' phantom has been annually raised, exorcised, and raised again, until it seemed as if we were all becoming quite contented with a ghost and nothing more. Happily, however, during the past year, this spirit has entirely vanished, and in the place of the visionary edifice with which you have each succeeding year been made more familiar, the committee rejoice to think that they can now present you with something more real and substantial as the result of their efforts to provide a suitable home for the institution. At the last annual meeting the members were informed that a very advantageous site had been purchased in Wolverhampton-street, plans prepared, the probable cost ascertained, and all that was needed to justify the committee in at once proceeding to build was the prospect of obtaining funds sufficient for the necessary outlay. A great part of the succeeding year passed away, and yet the pleasing prospect of obtaining £4,000 (the estimated cost) did not appear in view. The committee being most anxious not to have to meet the members again without having done something, then considered whether it was possible to build only a portion of the contemplated structure. Finding that this could be done, they at once made arrangements for the commencement of so much of the building as would supply the more pressing wants of the institution. Tenders were invited, and that of Mr. Millward for £2,285 was accepted. Since then the committee have received from the Earl of Dudley an offer to subscribe £500, providing the whole design, including the large hall, be completed. Under these circumstances the committee, although they feel they are incurring a very heavy additional responsibility, have felt bound to take steps for the completion of the whole building as soon as possible; and now the committee point with pride to that auspicious day, so anxiously looked forward to by all the friends of this Institution, when the chief stone was laid of that building which has so long existed in our imaginations, but which is now rearing its grand proportions, and the noble appearance of which already begins to ornament the town. A very large sum of money will be necessary to complete the undertaking. At present little has been done in the way of collecting subscriptions; this, however, must now be commenced at once, as the building has so rapidly progressed that the funds at the disposal of the committee have already been exhausted. The committee, therefore, in concluding this report, earnestly hope that the call which will now be made upon the members and the inhabitants of the town will be most cheerfully responded to. The report was adopted amid acclamation. The balance sheet which was presented showed that the total amount received from all sources was £217 12s. 8d., while the expenditure had been £211 3s. 4d., leaving a balance in the treasurer's hands of £6 9s. 4d. After adopting the balance sheet, the meeting proceeded to pass the usual votes of thanks. Mr. Jones (organising agent and secretary of the South Staffordshire Union of Institutions), in alluding to the night school, intimated that it was highly creditable to the Institution, and observed that there were only two other Institutes with which he was connected that had engaged in so excellent a work. He urged the committee to persevere in this movement, and expressed confidence that it would be developed to a very great extent in those large rooms which were rearing their heads so auspiciously in Wolverhampton-street. Mr. Jones, at a subsequent part of the evening, entered into an elaborate explanation of the advantages to be derived from the union of the Institute with the Society of Arts, and strongly advocated the desirability of this Institute competing with others in the neighbourhood for the prizes and certificates of that Society. Towards the close of the meeting, Mr. Stokes informed the members present that one of the intended designs fer raising necessary funds was the holding of a bazaar on a grand scale at the opening of the new Institute. A vote of thanks having been passed to the chairman, the meeting separated.

Salisbury Literary and Scientific Institution.— The last report states that the number of members has increased to 274, and in consequence the reading-room has been used to a much greater extent than during any previous year. It is supplied with seven daily and thirteen weekly newspapers, and with the leading periodicals. In their last report the Committee alluded to the desirability of enlarging the library. Their warmest thanks are due for the liberality of the members and friends of the Institution which has enabled them to carry out this important object. By means of a special fund £50 worth of new books, most carefully selected, have been placed on the shelves, so that more than 1,500 volumes are now in circulation. A new catalogue has been published, and a more efficient organisation introduced, rendering the library one of the most attractive and useful branches of the Institution. The following is a list of the lectures delivered during the past year:—Henry Fawcett, Esq., on "Coral Insects;" Rev. G. G. P. Glossop, on "Photography;" Mr. T. E. Spinney, on "Music," with vocal and instrumental illustrations; Rev. R. Fitzgerald, on "Colour in Nature and Art;" The Very Rev. The Dean of Chichester, on "The Beginnings of Literature and Science;" J. A. Roebuck, Esq., on "Popular Education;" Rev. James Fraser, on "Addison;" Rev. M. F. Sadler, on "Hugh Latimer." A concert was given by Mr. T. E. Spinney, assisted by the cathedral choir, and the annual concert in aid of the funds was conducted by Mr. Kenningham. The Committee present their best thanks to the foregoing gentlemen, who have in every instance given their services gratuitously. In conjunction with the Committee of the South Wilts Museum, a conversazione was arranged, and owing to the kind way in which all who had it in their power to contribute to its success gave their assistance, the result was in the highest degree satisfactory. A large and valuable loan collection was exhibited in the Council Chamber, and both on the evening of the conversazione, and on several succeeding evenings, short addresses were delivered in explanation of the purposes of the meeting, and of the various objects of interest

in the room. The finances of the Institution are in a most satisfactory state, the income having amounted to £196 11s. 11½d., a balance of £8 8s. 1d. being in the treasurer's hands after discharging all the liabilities. In concluding their report, the Committee offer their hearty congratulations on the progress made during the past year.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Medical, 8½. Clinical Discussion. The President, "A Case of successful Excision of the Elbow Joint;" Dr. Greenhalgh, Dr. W. Abbotts Smith, Dr. Gibb, Mr. Henry Lee, and others will furnish communications.
R. Asiatic, 3.
Royal United Service Inst., 8½.

TUES. ...Civil Engineers, 8. Discussion upon "The Perennial and Flood Waters of the Upper Thames." And, if time permits, Mr. J. G. Fraser, "Description of the Lydgate and Buckhorn-Weston Railway Tunnels."
Statistical, 8. Mr. C. Walford, "On the Recent Financial and Taxation Statistics of the United States."
Pathological, 8.
Ethnological, 8. 1. Mr. Robert Swinhoe, "Ethnological Notes on Formosa." 2. Mr. John Crawfurd, "On the Commixture of Races—Western Asia."
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."

WED. ...Society of Arts, 8. Mr. Charles B. King, "On the Suppression and Extinction of Fires."
Meteorological, 7.
Geological, 8. 1. Dr. Harvey B. Holl, "On the Correlation of the several divisions of the Inferior Oolite in the Middle and South of England." 2. Mr. James Fergusson, "On Recent Changes in the Delta of the Ganges." Communicated by the President.
London Inst., 7.
Royal Horticultural. Camelia Show, 1. Floral Committee, 10. Fruit Committee, 10.

THURS...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. 1. Dr. M. T. Masters, F.L.S., "Description of some Remarkable Malformations affecting the genus *Lolium.*" 2. Mr. A. Adams, F.L.S., "On the Species of *Fusidæ* which inhabit the Seas of Japan."
Chemical, 8. 1. Prof. Abel, "On Native Coppers." 2. Dr. Divers, "Decomposition of Gun-cotton." 3. Mr. C. Greville Williams, "Chenoline Series." 4. Dr. Attfield, "Oxamide."
Numismatic, 7.
Royal Soc. Club, 6.
Royal Inst., 3. Dr. E. Frankland, "On Chemical Affinity."

FRI.......Royal Inst., 8. Mr. Balfour Stewart, "On Magnetic Forces."
Philological, 8.
R. Horticultural. Council, 11. Election of Fellows, 2.

SAT.......Royal Inst., 3. Professor Max Muller, "On the Science of Language."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered during the Vacation 1862.

Par. Numb.

Delivered on 14th and 16th February, 1863.

4. Scottish Universities—Paper.
26. Bank of England—Paper.
8. Government Houses, &c.—Return.
25. Bank of England—Annual Accounts.
28. Navy Estimates.
9. Bills—Births and Deaths Registration (Ireland).
16. ,, Telegraphs.
17. ,, Union Relief Aid Act (1862) Continuance.
14. ,, Church Rates Commutation.
15. ,, Aggravated Assaults on Women and Children.
Affairs of Rome—Further Paper.

Delivered on 17th February, 1863.

11. Flogging (Navy)—Return.
12. Military Reserve Fund—Return.
15. China—Return.
27. Mint—Account.
30. Navy (Steam and Sailing Ships)—Return.
34. Remission of Sentences—Return.
6. Bills—Railway Bills.
18. ,, Innkeepers' Liability (No. 1).

Delivered on 18th February, 1863.

35. Greek Loan—Account.
36. Sardinian Loan—Account.
39. Coroners' Inquests—Return.
19. Bills—Ballot at Municipal Elections.
20. ,, Malt Duty.
21. ,, Tobacco Duties.
23. ,, Thames Embankment (North Side).
Affairs of the Duchies of Holstein, Lauenburg, and Schleswig—Correspondence.

Delivered on 20th February, 1863.

16. Army Commissions—Return.
31. East India (Loan)—Return.
32. East India (Revenues)—Return.
37. Russian Dutch Loan—Account.
38. Naval Receipt and Expenditure—Account.
44. Exchequer, &c.—Accounts.
47. Committee of Selection—First Report.
29. Railway and Canal, &c., Bills—Board of Trade General Report.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, February 27th*, 1863.]

Dated 18th February, 1863.

441. J. Barker and E. Moss, Manchester—Imp. in portable and stationary crabs or cranes.
443. J. H. Bly, Great Yarmouth—Imp. in cooking stoves.
447. F. J. Reed, 3, Gresham-street—Imp. in apparatus for traversing guns. (A com.)
449. J. Puntis, Southampton, and G. Cox, Throgmorton-street—Improved appliances for displaying in the open air or indoors illuminated designs, devices, mottoes, or announcements, and in which jets of gas are employed as the illuminating agent.

[*From Gazette, March 6th*, 1863.]

Dated 23rd October, 1862.

2851. J. T. Stroud, Birmingham—Imp. in lamps for general and special purposes and in parts connected with the same.

Dated 11th November, 1862.

3039. H. Burridge, 15, Grenville-street, Brunswick-square—Imp. in apparatus for extinguishing fires, applicable also for ventilating and fumigating, and for supplying, delivering, and distributing fluids.

Dated 29th December, 1862.

3469. W. Billinghurst and J. Requa, Rochester, U.S.—An improved portable battery.

Dated 6th January, 1863.

43. J. Eckersley, Westhoughton, Lancashire—Imp. in looms for weaving.

Dated 9th January, 1863.

83. W. Tasker, Waterloo Iron Works, near Andover—Imp. in the construction of harrows.

Dated 19th January, 1863.

165. B. Van der Mark, 8, Great John-street, Manchester—A new and improved musical instrument of the harmonica class.

Dated 26th January, 1863.

230. A. L. Liétout, Paris, and J. B. Roisin, 56, Rue de Sablonville, Neuilly, Paris—Imp. in gymnastical apparatus.

Dated 31st January, 1863.

285. J. Lightfoot, Accrington, and F. Trachsel, Manchester—Imp. in machinery or apparatus used in the process of distillation.

Dated 4th February, 1863.

320. C. Faulkner, D. Faulkner, and J. Fairley, Birmingham, and W. C. Stiff, Edgbaston, near Birmingham—Imp. in the manufacture of gun barrels.

Dated 7th February, 1863.

347. C. Parigot and A. Grivel, 29, Boulevart St. Martin, Paris—Imp. in locks.

Dated 12th February, 1863.

379. F. Oppenheim, 379, Strand—An improved plastic compound for dental purposes, to be used instead of wax, gutta percha, or resinous gums, in taking the impression of the mouth (Partly a com.)

Dated 13th February, 1863.

388. J. Jones, Liverpool—Imp. in the manufacture of lead, tin, and other metals, or amalgamation of metals of a like fusible nature into sheets of any required thickness and length, and also coating one or both sides of pipes and sheets of lead and other metal or amalgamation of metals with tin or other substances, and in the apparatus connected therewith.
390. J. Robertson, Dumbarton—Imp. in apparatus or means for printing woven fabrics by blocks.
392. W. Robertson, Manchester—Imp. in machines for spinning and doubling.
393. G. Wrigley and S. Morris, Dukinfield, Cheshire—Imp. in machines for spinning and doubling.
394. O. H. Hodge, Shoreditch—Imp. in hat brims, in the manufacture of hat brims, and in the apparatus or machinery used in such manufacture.
396. S. Whitaker, Craddock-street, Haverstock-hill—Imp. in indicating the positions and conditions of railway signals and points, and in the apparatus employed therein.

Dated 14th February, 1863.

398. R. Baguley, Greenlow Mill, Blackburn—Imp. in the construction of creels for warping machines, and other machines to which creels are applied.

400. W. C. Paul and A. T. Shore, Queen's-road, Bayswater—Imp. in the mode of constructing spring mattresses and other such articles for sitting or reclining upon.
401. J. S. Gisborne, Birkenhead, and W. Simpson, Liverpool—Imp. in means for rendering ships and other compasses insensible to local attraction.
402. H. Dembinski, Rue de l'Oratoire du Roule, No. 13, Paris—A new motive apparatus and processes proper for giving to it a continuous motion and unlimited strength.
404. W. Wood, Aston-under-Lyne—Certain imp. in cutting or producing screws or threads, and in apparatus connected therewith.
406. J. H. Walsh, Kensington—Imp. in breech-loading fire-arms, and in the cartridge cases to be used therewith.
408. W. Clark, 53, Chancery-lane—Imp. in the method of and apparatus for separating the fibres of straw, wood, and other vegetable substances, and extracting the gummy and colouring matters therefrom, to render them fit for paper stock, or for other purposes. (A com.)
410. J. Higgins and H. Higgins, Salford—Imp. in carding engines, and in apparatus connected therewith.
412. J. Morgan, 23, Stephen's-green North, Dublin—Imp. in embalming and preserving from decay human bodies and bodies of other animals, also pickling, curing, and flavouring animal bodies.

Dated 16th February, 1863.

416. C. D. Abel, 20, Southampton-street, Chancery-lane—An improved omnibus. (A com.)
418. J. B. Watts, Birmingham—Imp. in the manufacture of matchets and swords.
420. R. A. Brooman, 166, Fleet-street—An improved cover or protection for steel and other metal springs, ribbands, and hoops. (A com.)
422. J. H. Haywood and W. Vernon, Nottingham—Imp. in packing bonnet fronts, rouches, and other similar articles.
424. W. Nalder, Challow Works, Wantage—Imp. in rotatory screens, and in the machinery or apparatus employed in the manufacture of such screens.

Dated 17th February, 1863.

426. T. W. Salmon, Mile End Old Town—Imp. in washing machines.
428. W. T. Dibb, Hull—An imp. in brewing.
430. J. Gimson, Leicester—Imp. in presses for punching or cutting out leather and other substances.
432. J. Durant, Sussex-street, St. Pancras—Imp. in chimney tops.
434. J. W. Lane, Caledonian-road—Imp. in fastenings for studs, sleeve fasteners, solitaires, bracelets, brooches, and other uses.
436. H. Tomlinson, Rotherham—Imp. in stoves or fireplaces for warming apartments.

Dated 18th February, 1863.

438. E. Strawson, 9, Royal Arcade, New Oxford-street—Imp. in the manufacture of buttons, which may be instantaneously attached without sewing.
439. G. K. Geyelin, 13, Chenies-street—An improved grate whereby the perfect combustion of the various compounds of coal is produced.
440. M. Siegrist, Ewell, Surrey—An improved atmospheric brake or break.
442. J. F. Spencer, Newcastle-upon-Tyne—Imp. in apparatus for regulating and working the valves of steam and other engines.
444. F. Johnston and R. Heatley, Blackburn—Certain imp. in looms for weaving.
446. G. T. Bousfield, Loughborough-park, Brixton—Imp. in breech-loading fire arms. (A com.)

Dated 19th February, 1863.

452. T. Markland, Hyde, Cheshire, and J. C. Dickinson, Blackburn—Certain imp. in machinery or apparatus for warping or beaming yarns or threads.
454. L. A. Pouget, 39, Rue St. Sebastien, Paris—Imp. in the manufacture of oil lamps.
456. J. J. Badart, 95, Bishopsgate-street—Imp. in the preparation of cotton seed cake.
458. N. Thompson, 15, Abbey-gardens, St. John's-wood—Imp. in apparatus for stopping bottles, jars, and other vessels, and in tools for producing parts of such apparatus.

Dated 20th February, 1863.

462. C. Billingsley, Manchester—Imp. in saddlery, harness, driving straps, and similar articles.
464. C. W. Siemens, 3, Great George-street, Westminster—Imp. in insulating and supporting telegraph line wires.
466. R. Bell, Gracechurch-street—Imp. in armour plating or protecting ships and vessels.
470. W. Husband, Hayle, Cornwall, and J. Quick, Sumner-street, Southwark—Imp. in apparatus for raising sewage and water.

Dated 21st February, 1863.

472. R. Thompson, Wigan, Lancashire—Imp. in apparatus for moulding.
474. F. J. Manceaux, Paris—Imp. in fire-arms, or in transforming arms of large calibre into arms of smaller calibre.
476. R. V. Dodwell, Manchester—An improved method of preventing the destruction of plants by insects and certain descriptions of animals, and in the means for effecting the same.
478. A. Ceileur, Shawbury-villas, Camden-road—Imp. in apparatus for taking photographic impressions or likenesses by means of the camera.
480. H. Mackinder, Mere-hall, Lincoln—Imp. in apparatus for separating potatoes into different sizes.
482. A. Dugdale, Rue de Courcelles, Paris—Imp. in throttle valves.

Dated 23rd February, 1863.

486. E. T. Hughes, 123, Chancery-lane—Imp. in the process of cleaning organic matter. (A com.)
488. R. A. Brooman, 166, Fleet-street—Imp. in dressing millstones, in ornamenting or engraving on glass, pottery, and other similar substances, and in materials employed therein. (A com.)
490. J. D. Welch and A. P. Welch, Gutter-lane—Imp. in machinery for blocking and pressing hats and bonnets.
492. T. R. Harding, Leeds—Imp. in machinery for carding and combing flax, wool, cotton, and other fibrous substances.
494. J. Tatham, Rochdale—Imp. in machinery or apparatus for preparing cotton and other fibrous materials for spinning.

Dated 24th February, 1863.

500. J. Hawthorn, Burslem, Staffordshire—Certain imp. in handles for doors, drawers, and other means of enclosure.
504. J. Le-Butt, Bury St. Edmunds—Imp. in machinery for dressing grain.
506. D. B. Chatterton, Chester, Cheshire—Improved brick-making machinery.
508. H. B. Willson, Montague-place, Russell-square—Imp. in the construction of war and merchant ships.
510. A. Junger, Hamburg—An improved life-preserving garment.
512. R. W. Thomson, Edinburgh—Imp. in obtaining and applying motive power, which imp. or parts thereof are applicable for raising, forcing, and measuring fluids.
514. W. Clark, 53, Chancery-lane—Imp. in sewing machines. (A com.)

Dated 25th February, 1863.

516. H. Wilde, Manchester—Imp. in electro-magnetic telegraphs.
520. J. Fitter, Birmingham—An imp. or imps. in the construction of castors for tables, chairs, and other furniture or other articles.
522. E. B. Wilson, 5, Parliament-street, Westminster—An imp. or imps. in the manufacture of an alloy or alloys of titanium and iron.
524. B. Lawrence and W. Niblett, Newport, Monmouthshire—Imp. in apparatus for regulating the flow of gas for purposes of illumination.
530. W. Hudson and C. Catlow, Burnley, Lancashire—Imp. in looms for weaving.
534. G. Tomkins, Morriston, Glamorganshire—Imp. in the manufacture of tin and terne plates, and in the apparatus to be employed therein.

Dated 26th February, 1863.

536. H. W. Brown, Walham-green—Imp. in window frames, and in glazing windows.
538. G. H. Lilley, Dalston—Imp. in apparatus for connecting and securing together planks of wood, applicable to the building and caulking of ships and other vessels.
542. J. Yates, Rotherham—Imp. in the manufacture of armour plates or blocks for defensive purposes.
544. W. Clark, 53, Chancery-lane—Imp. in the manufacture o buttons, and in apparatus for the same. (A com.)
546. J. Humby, 14, Gresham-house, Old Broad-street—Imp. in furnaces and apparatus for manufacturing oxide of zinc or zinc white. (A com.)
548. F. H. Twilley, Dean-street, Soho—Imp. in book slides or holders.

Patents Sealed.

[*From Gazette, March 6th*, 1863.]

February 24th.
30. W. E. Newton.
March 6th.
2480. F. Selby.
2484. J. Saunders.
2485. J. Saunders.
2495. W. A. Munn.
2497. G. Weeks.
2500. J. Hemsley.
2501. R. A. Brooman.
2503. L. C. Hoyau.
2514. J. R. Johnson and J. S Atkinson.
2518. A. J. Moreau.
2519. H. Higgins.
2520. G. Bedson.
2525. T. W. Cowan.
2562. J. W. Woodford.
2634. M. Henry.
2720. M. A. F. Mennons.
3336. J. W. Baker.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, March 10th*, 1863.]

March 2nd.
808. A. Pentzlin.
March 3rd.
600. J. H. Johnson.
699. W. Weild.
March 4th.
602. T. W. Ashby & J. Coulson.
644. W. E. Newton.
880. W. Clark.
March 5th.
617. R. Pitt.
March 6th.
625. J. Imray and J. Copeland.
636. G. Spiller.
640. C. Sheldon.
650. J. H. Young.
776. J. M. Carter.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, March 10th*, 1863.]

March 3rd.
609. G. Rees.
March 5th.
893. A. V. Newton.
March 6th.
626. R. W. Winfield, J. Simms, and T. Lloyd.

Journal of the Society of Arts.

FRIDAY, MARCH 20, 1863.

NOTICE TO MEMBERS.

The Index to the first ten volumes of the *Journal* is now being issued to those members who have applied for it. Any other members desiring copies can have them on application to the Secretary.

COMMITTEES OF REFERENCE.

The Chemical Committee met on Friday, the 13th inst., Sir Thomas Phillips, Chairman of the Council, in the chair. The Chairman invited the Committee to suggest subjects in connection with chemistry as applied to manufactures, to which the attention of the Society might advantageously be directed. Various subjects were then put forward by different members of the Committee, in respect of which it appeared desirable that premiums should be offered by the Society, and it was arranged that a circular should be sent to each member of the Committee, inviting further suggestions in relation to the premium list about to be issued by the Society.

SOCIETY OF ARTS EXAMINATIONS, 1863.—NOTICE TO LOCAL BOARDS.

The Previous Examinations by the Local Boards should be held forthwith, so that the Form 2 (see Programme) may be returned by the 1st April.

Any Local Boards expecting to have candidates desiring to be examined in Music, should apply to the Secretary of the Society of Arts without delay, who will furnish them with a form of test to be used at the Previous Examination in that subject, as explained in Par. 111 of the Programme.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary*.

The subscription of each member is limited to one guinea.

The following is the list of subscribers up to the 19th inst.:—

Abbott, Major-General Sir Frederick, C.B.	£1	1	0
Adams, Thomas	1	1	0
Adams, George G.	1	1	0
Adams, George William	1	1	0
Addington, Right Hon. Henry Unwin	1	1	0
Adley, Charles Coles	1	1	0
Akroyd, Edward	1	1	0
Alger, John	1	1	0
Allen, Thomas	1	1	0
Ames, John	1	1	0
Anderton, James	1	1	0
Andrew, W. P.	1	1	0
Asprey, Charles	1	1	0
Artingstall, George	1	1	0
Atkins, George James	1	1	0
Atkinson, William	1	1	0
Austin, James	1	1	0
Avery, Thomas Charles	1	1	0
Bacon, Jacob Perkins	1	1	0
Bagnall, Charles	1	1	0
Balleras, Guillermo Esteban	1	1	0
Barber, Charles	1	1	0
Barry, Dykes	1	1	0
Bartholomew, C.	1	1	0
Bartlett, William E.	1	1	0
Bateman, J. F.	1	1	0
Baylis, W. Henry	0	10	6
Beckwith, Edward Lonsdale	1	1	0
Belcher, Rear-Admiral Sir Edward	1	1	0
Bell, John	1	1	0
Bentley, Robert J.	1	0	0
Best, Hon. and Rev. Samuel, M.A.	1	1	0
Betts, Edward Ladd	1	1	0
Beyer, Charles F.	1	1	0
Birkett, John	1	1	0
Bischoff, James	1	1	0
Black, Alexander	1	1	0
Blagden, George	1	1	0
Blaine, Delabere Roberton	1	1	0
Bodkin, William Henry	1	1	0
Boileau, Sir John P., Bart., F.R.S	1	1	0
Bonnewell, William Henry	1	1	0
Bosanquet, George Jacob	1	1	0
Bowley, Robert K.	1	1	0
Boyd, James	1	1	0
Braby, Frederick	1	1	0
Brassey, Thomas	1	1	0
Breillat, E.	1	1	0
Bremner, Samuel	1	1	0
Brett, John W.	1	1	0
Brickwood, John Strettell	1	1	0
Bright, Sir Charles	1	1	0
Broad, Robert	1	1	0
Brook, Charles	1	1	0
Brooke, Charles, F.R.S.	1	1	0
Brooke, John	1	1	0
Brookes, William	1	1	0
Brooks, Henry	1	1	0
Browell, Edward M.	1	1	0
Brown, Henry	1	1	0
Brown, Sir William, Bart.	1	1	0
Browne, Edward	1	1	0
Budgett, John P.	1	1	0
Burgoyne, Gen. Sir John F., Bart., G.C.B., F.R.S.	1	1	0
Burton, William S.	1	1	0
Cama, M. H.	1	1	0
Candy, Charles	1	1	0
Caplin, Madame R. A.	1	1	0

Champion, Percival	1	1	0
Chance, Robert Lucas	1	1	0
Charlton, Henry	1	1	0
Chater Joseph	1	1	0
Chester, Harry	1	1	0
Christie, Robert Monro	1	1	0
Clabon, John M.	1	1	0
Clutton, John	1	1	0
Cock, John, Junr.	1	1	0
Coghlan, H. T.	1	1	0
Cohen, Henry Louis	1	1	0
Cole, Henry, C.B.	1	1	0
Colman, Jeremiah James	1	1	0
Cooper, William	1	1	0
Cope, Walter	1	1	0
Corbett, John	1	1	0
Corderry, Edward	1	1	0
Cosens, Frederick W.	1	1	0
Coulson, William	1	1	0
Courtauld, Samuel	1	1	0
Creed, Henry	1	1	0
Critchett, Charles (Assistant Secretary)	1	1	0
Cubitt, William	1	1	0
Cullingford, W. H.	1	1	0
Curling, Joseph	1	1	0
Curtis, William	0	10	6
Crawford, Robert Wygram, M.P.	1	1	0
Darby, Abraham	1	1	0
Davenport, Samuel Thomas (Financial Officer)	1	1	0
Davidson, Thomas	1	1	0
Dawbarn, George	1	1	0
Dawbarn, Richard W.	1	1	0
Dawbarn, Robert	1	1	0
Dawson, Henry	1	1	0
Day, William	1	1	0
Deane, Edward	1	1	0
Debary, Peter Francis	1	1	0
Dickson, Peter, F.R.G.S.	1	0	0
Dilke, Sir C. Wentworth, Bart.	1	1	0
Dilke, Charles W.	1	1	0
Dillon, John	1	1	0
Dines, George	1	1	0
Dix, Thomas	1	1	0
Dixon, Thomas	1	1	0
Docker, F. W.	1	1	0
Dowleans, A. M.	1	1	0
Drax, J. S. W. S. Erle, M.P.	1	1	0
Duncum, Charles	1	1	0
Dunn, Thomas	1	1	0
Dutton, William C.	1	1	0
Eamonson, Joshua J.	1	1	0
Eastham, John	1	1	0
Easton, James	1	1	0
Easton, Percy Shand	1	1	0
Ebury, Lord	1	1	0
Elliot, William Henry Fletcher	1	0	0
Ellis, William	1	1	0
Ethelston, Rev. Charles Wickstead, M.A.	1	1	0
Evans, E. Bickerton	1	1	0
Evans, Jeremiah	1	1	0
Ewart, William M.P.	1	1	0
Faraday, Michael, D.C.L., F.R.S.	1	1	0
Faulkner, John, Junr.	1	1	0
Fauntleroy, Robert Thomas	1	1	0
Field, John	1	1	0
Field, William	1	1	0
Foley, Lord	1	1	0
Fordham, Thomas	1	1	0
Foster, P. Le Neve (Secretary)	1	1	0
Fox, Sir Charles	1	1	0
Fowler, Robert N.	1	1	0
Freer, Rev. Richard Lane, D.D.	1	1	0
Fussell, Alexander	1	1	0

Gadesden, Augustus William	1	1	0
Garling, Henry	1	1	0
Geeves, William	1	1	0
Gibson, Henry	1	1	0
Gilbart, James William, F.R.S.	1	1	0
Goding, Charles	1	1	0
Godwin, George, F.R.S.	1	1	0
Gonzaga, H. S. H. the Prince Alexander of, and Duke of Mantua	1	1	0
Gooch, Joseph H.	1	1	0
Gooch, Thomas	1	1	0
Goode, Thomas	1	1	0
Gordon, Col. W. J., C.B., R.E., D.A.G.	1	1	0
Gould, Charles Augustus	1	1	0
Graham, Peter	1	1	0
Graham, Thomas, D.C.L., F.R.S.	1	1	0
Graham, William	1	1	0
Grant, Alexander	1	1	0
Grey, Major-General the Hon. Charles	1	1	0
Grove, W. R., Q.C., F.R.S.	1	1	0
Gruneisen, Charles Lewis	1	1	0
Hack, Thomas	0	10	6
Haden, F. Seymour, F.R.C.S.	1	1	0
Hall, Walter	1	1	0
Hamilton, Edward	1	1	0
Hamilton, Sir Robert N. C., Bart.	1	1	0
Hammond, William Parker	1	1	0
Hammond, W. Parker	1	1	0
Hancock, James Lyne	1	1	0
Hancock, Frederick William	1	1	0
Hanhart, Michael	1	1	0
Hannay, John	0	10	6
Hannay, Robert	1	1	0
Hannay, Robert, Jun.	0	10	6
Hannay, Thomas	0	10	6
Hannington, C. S.	1	1	0
Harrison, Henry	1	1	0
Harrison, Thomas E., C.E.	1	1	0
Hawes, William	1	1	0
Hawkshaw, John, F.R.S.	1	1	0
Hayward, T. Carlyle, Jun.	0	10	6
Headland, Edward	1	1	0
Heal, John Harris	1	1	0
Heane, Henry	1	1	0
Heather, James	1	1	0
Hereford, the Dean of	1	1	0
Heymann, Lewis	1	1	0
Heywood, James	1	1	0
Hick, John	1	1	0
Hicks, Thomas	1	1	0
Hill, Charles	1	1	0
Hollins, Michael Daintree	1	1	0
Holmes, Alfred William	1	1	0
Holmes, Herbert Mountford	1	1	0
Holmes, James	1	1	0
Hooper, Bartlett	1	1	0
Hooper, George Norgate	1	1	0
Horner, Edward	1	1	0
Horton, Isaac	1	1	0
Horton, John	1	1	0
Howard, Philip Henry	1	1	0
Howard, Thomas	1	1	0
Imhof, Daniel	1	1	0
Jackson, Richard M.	1	1	0
James, Jabez	1	1	0
James, Jabus Stanley	1	1	0
Jellicoe, Charles	1	1	0
Jewesbury, H. W.	1	1	0
Joel, Joseph	1	1	0
Johnson, Henry	1	1	0
Johnson, Jabez	1	1	0
Jones, James W.	1	1	0
Jones, Owen	1	1	0

Jones, Richard Lambert	1	1	0
Keeling, Herbert Howard	1	1	0
Kelk, John	1	1	0
Kemp, George T.	1	1	0
Khaznadar, S. E. le Général Moustapha, Premier Ministre de S.M. Tunisienne	1	1	0
Lacy, Henry Charles	1	1	0
Lambert, Thomas	1	1	0
Larnach, Donald	1	1	0
Lavanchy, John R.	1	1	0
Lawrence, Frederick	1	1	0
Le Couteur, Col. John, F.R.S.	1	1	0
Leeks, Edward Frederick	1	1	0
Leighton, John, F.S.A.	1	1	0
Levi, Leone	1	1	0
Lewis, Stephen W.	1	1	0
Linnington, A. H.	1	1	0
Longstaff, G. Dixon, M.D.	1	1	0
Lovegrove, James Samuel	1	1	0
Lovegrove, Samuel	1	1	0
Lowe, George, F.R.S.	1	1	0
Lucas, Thomas	1	1	0
Macarthur, Major-Gen. Sir Edward, K.C.B.	1	1	0
MacDonald, J. C.	1	1	0
Macfarlane, Walter	1	1	0
Mackrell, W. T.	1	1	0
Maclaran, George	1	1	0
Maclea, Charles G.	1	1	0
Malcolm, Major-Gen. G. A.	1	1	0
Manby, Charles, F.R.S.	1	1	0
Marryatt, Joseph	1	1	0
Marsh, Matthew Henry, M.P.	1	1	0
Martin, John	1	1	0
Martin, Thomas	1	1	0
Martineau, David	1	1	0
Martyn, Silas Edward	0	10	6
Matthew, James	1	1	0
May, Harry	1	1	0
Mayor, Right Hon. the Lord	1	1	0
McMurray, William	1	1	0
Mechi, Alderman	1	1	0
Merle, William Henry	1	1	0
Metchin, W. P.	1	1	0
Middleton, David	1	1	0
Miles, Alfred W.	1	1	0
Mocatta, Benjamin	1	1	0
Moore, Charles	0	10	6
Morant, Robert	1	1	0
Moule, John	1	1	0
Moulton, Stephen	1	1	0
Muir, William	0	10	6
Mulready, William, R.A.	1	1	0
Munn, Major W. A.	1	1	0
Murchison, J. H.	1	1	0
Murchison, Sir Roderick Impey, K.C.B., D.C.L.	1	1	0
Napier, Robert	1	1	0
Navroji, Dádábhái	1	1	0
Newcombe, S. Prout	1	1	0
Noble, Matthew	1	1	0
Oastler, Jonah	1	1	0
Oldershaw, Capt.	1	1	0
Owen, Professor Richard, F.R.S.	1	1	0
Pagden, Stephen	0	10	6
Pakington, Sir John S., Bart., M.P.	1	1	0
Palmer, George	1	1	0
Paul, J. Michell	1	1	0
Pearce, Alfred B.	1	1	0
Penn, John	1	1	0
Petrie, Samuel	1	1	0
Pierce, William	1	1	0
Phelps, Charles	1	1	0
Phillips, Sir Thomas, F.G.S.	1	1	0
Pitts, Samuel	1	1	0
Platt, John	1	1	0
Potter, Thomas	1	1	0
Preller, C. A.	1	1	0
Price, Arthur J.	1	1	0
Proctor, John	1	1	0
Provis, William Alexander	1	1	0
Pryor, William S.	1	1	0
Quain, Richard, M.D.	1	1	0
Radstock, Lord	1	1	0
Ratcliff, Charles	1	1	0
Rawlinson, Robert	1	1	0
Rawson, W. H. Jun.	1	1	0
Redgrave, Samuel	1	1	0
Reeve, Charles	1	1	0
Reeves, John Russell, F.R.S.	1	1	0
Reid, Lestock Robert	1	1	0
Reiss, James	1	1	0
Rennie, Sir John, F.R.S.	1	1	0
Reveley, Henry W	0	10	0
Rivett, Joseph Cedric	1	1	0
Rixon, Alfred H.	1	1	0
Robb, Alexander	1	1	0
Roberts, Henry, F.S.A.	1	0	0
Rodocanachi, M. E.	1	1	0
Routledge, Thomas	1	1	0
Russell, Capt. G.	0	10	0
Russell, John	1	1	0
Russell, John James	1	1	0
Russell, John Scott, F.R.S.	1	1	0
St. David's, Bishop of	1	1	0
Salomons, Aaron	1	1	0
Salomons, David	1	1	0
Salt, Titus	1	1	0
Sargood, F. J.	1	1	0
Saul, G. T.	1	1	0
Schneider, Richard	1	1	0
Sedgwick, John Bell	1	1	0
Shearer, Bettesworth Pitt	1	1	0
Sheriff, G. W.	1	1	0
Shove, W. Spencer	1	1	0
Sibthorp, Henry, A. M. W.	1	1	0
Sich, Henry	1	1	0
Silverlock, H.	1	1	0
Simon, George	1	1	0
Simpson, William Butler	1	1	0
Skey, Joseph, M.D.	1	1	0
Smart, Sir George T.	1	1	0
Smith, George	1	1	0
Smith, George	1	1	0
Smith, J. Scott	1	1	0
Smith, R. M.	1	1	0
Smith, T. Mosdell	1	1	0
Sopwith, Thomas, F.R.S.	1	1	0
Spark, Henry King	1	1	0
Spicer, Henry	1	1	0
Spicer, William Revel	1	1	0
Stanton, George	1	1	0
Stephens, Charles	1	1	0
Stephens, Henry	1	1	0
Stirling, Thomas	1	1	0
Stohwasser, Joseph	0	10	6
Straker, John	1	1	0
Styles, Thomas	1	1	0
Sugden, Samuel	1	1	0
Sulivan, Right Hon. Lawrence	1	1	0
Symonds, Capt. R.N.	1	1	0
Sykes, Col. W. H., M.P., F.R.S.	1	1	0
Taylor, George	1	1	0
Taylor, John	1	1	0

Teulon, Seymour	1	1	0
Thomas, John Evan, F.S.A.	1	1	0
Tooke, William, F.R.S. (President of the Society)	1	1	0
Trevelyan, Arthur	1	1	0
Trevelyan, Sir Walter Calverley, Bart.	1	1	0
Trower, G. S.	1	1	0
Tuely, Nathaniel C.	1	1	0
Tueski, Moritz Paul	1	1	0
Tulloch, James	1	1	0
Turner, W. Shearman	1	1	0
Twining, Thomas	1	1	0
Underdown, E. M.	1	1	0
Unwin, George	0	10	0
Vandoni, Le Commandeur Comte de	1	1	0
Vane, Rev. John	1	1	0
Varley, Cornelius	0	10	6
Veitch, James	1	1	0
Vieweg, A. J.	1	1	0
Walker, Sir Edward S.	1	1	0
Wass, C. Wentworth	0	10	6
Watkins, Zachariah	1	1	0
Watney, Norman	1	1	0
Watson, Dr. J. Forbes, M.A.	1	1	0
Watson, Thomas	1	1	0
Webb, Charles Locock	1	1	0
Webb, Henry Bellamy	1	1	0
Webb, John	1	1	0
Webber, Henry	1	1	0
Whetham, Charles	1	1	0
White, H. C.	1	1	0
Whitfeld, Henry	1	0	0
Willich, C. M.	1	1	0
Williams, Charles Wye	1	1	0
Williams, R.	1	1	0
Williams, Walter	1	1	0
Williams, William	1	1	0
Wilson, G. Fergusson, F.R.S.	1	1	0
Wilson, W. Newton	1	1	0
Winkworth, Thomas	1	1	0
Woodd, Basil Thomas, M.P.	1	1	0
Wood, John	1	1	0
Wood, Vice-Chancellor Sir W. Page	1	1	0
Woodhouse, John Thomas	1	1	0
Woollams, Henry	1	1	0
Woolloton, Charles	1	1	0
Wright, Philip	1	1	0
Wyon, Joseph Shepherd	1	1	0
Wyon, Leonard C.	1	1	0
Yeats, John, LL.D., F.R.G.S.	1	1	0
Zaehnsdorf, Joseph	0	10	6
Zetland the Earl of	1	1	0

FIFTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 18, 1863.

The Fifteenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 18th inst., Thomson Hankey, Esq., M.P., in the chair.

The following candidates were proposed for election as members of the Society :—

Beech, Thomas	6, Russell-place, Old Kent-road, S.E.
Beevor, Charles	41, Upper Harley-street, W.
Bell, Alexander	18, Harrington-square, N.W.
Carpenter, William	8, Brunswick-square, W.C.
Perkins, George	Clipsted-place, Sevenoaks.

The following Candidates were balloted for and duly elected members of the Society :—

Allen, J.	81, Stainsby-road, East India-road, E.
Allum, Edwyn	43, Kensington-square, W.
Anderdon, James Hughes.	23, Upper Grosvenor-st., W.
Arber, Edward, A.K.C.	Admiralty, Somerset House, W.C.
Baccani, Attilio	1A, Cranley-terrace, Brompton, S.W.
Bailey, John	10, Conduit-street East, Paddington, W.
Banister, John	13, South-st., Finsbury, E.C.
Chadburn, Charles Henry.	71, Lord-street, Liverpool.
Grattann, William Henry.	1, Belmont-villas, Kensington, W.
Kerrison, Sir Edward C., Bart., M.P.	140, Piccadilly, W.
Lovegrove, John James.	6, Pembroke-place, Spring-grove, Isleworth, W.

The SECRETARY drew attention to an instrument for sounding alarum in case of fire, or regulating ventilation in accordance with the temperature of the apartment. See page 318.

The Paper read was—

ON THE SUPPRESSION AND EXTINCTION OF FIRES.

BY CHARLES B. KING, M.E.

The subject upon which I have the honour to address this Society is one of great importance, and one which has been considerably overlooked. In large manufacturing towns and cities, where immense wealth, in the shape of merchandise, is closely packed and stored, the importance of an improved construction of fire-proof warehouses cannot be over rated. Again, in a densely populated district, should there not be as much attention directed towards the safety of human lives from the fearful ravages of the devastating element, as from the ordinary diseases and infections arising from defective sewage and ventilation. These are questions I find no difficulty in answering ; the remedy I apprehend rests with the public themselves (who are really the interested parties), by raising unanimously their voice of appeal to the government, and it is the object of the present paper to give, in a succinct form, a few facts collected from practical experience.

The first section of my paper, as its title implies, will be directed to a consideration of means tending to the suppression of fires, and on this point it will be found that carefulness, which is a remedy for all existing evils, is also the main one tending to a suppression of fires; the careless handling of open lights, lucifer-matches, children playing with fire, reading in bed, airing linen before a fire, improper gas fitting, raking out a fire at night before retiring to rest, are all of them common and prolific sources from which fires arise; and sources, too, that a little care and attention may prevent. The lagging of steam-pipes often becomes red-hot, and, dropping off, ignites any timber that may be near. A very serious item of loss is caused by linendrapers and other dealers in textile fabrics removing their goods from their shop windows with the gas burning, flues taking fire, the use of explosive oils in lamps, and many others could be added to the foregoing list of fires caused by thoughtlessness. A remedy for this might be found by masters at short intervals minutely examining their premises and stock, and strongly enforcing the obedience of a code of rules specially adapted to each particular case.

It was urged by the late Mr. James Braidwood, Superintendent of the London Fire Engine Establishment (in an admirable paper read before your Society, on May 7th, 1856), that an official inquiry into the causes of fires would be one of the greatest preventives of the carelessness above alluded to, as it would not only show the faults that had been committed, and thus warn others, but the idea of being publicly exposed in the press would be an additional

incentive to carefulness. Mr. Payne, the coroner, some years ago, held inquests on fires that occurred in the City, but as the authorities would not allow him his expenses, these inquiries were discontinued, although believed to be of considerable service in explaining accidental and other causes of fire.

Buildings cannot be made wholly fire-proof, but they can be constructed with a view of rendering them impervious to fire, viz., to resist, not assist, any fire that may break out upon their floors. Many architects and other persons of position have from time to time turned their attention to this subject, and a large number of patents have been the result of their deliberations. It would be needless to go through the list of these, so I shall draw your attention to the model mill at Saltaire, belonging to Messrs. Titus Salt, Sons, and Co., which has been constructed fire-proof throughout. The floors, as you will see by reference to the diagram on the wall, are composed of longitudinal cast-iron girders, from the bottom flange of which a brick arching is sprung; this is bound together transversely by tie-rods on the top of the arching; to form the floors flagstones are laid, between which and the arch a layer of concrete is placed.

Another description of fire-proof buildings are those in which a water service is laid on, ready to subdue any fire that may occur. To illustrate this I will briefly draw your attention to a plan proposed and patented by Mr. Joseph Beattie, Locomotive Superintendent of the London and South-Western Railway Company, and applied by him to the railway workshops at Nine Elms; his plan being as follows:—He places in the brick-work, or other materials of which the main building is composed, one or more cast-iron main pipes from the basement or ground-floor to the roof or other part of the building, as may be required, and has branch pipes from each main pipe into each floor, and, if required, into each room, and carries such branch pipes round the ceiling; these are perforated, and have ornamental mouths or roses. There are also suitable joints or cocks, so that when a fire has broken out in any room or corner of a room, the water can be forced by steam or other power from below, through the main pipe, from thence through the branches into the rooms, as required, for the extinction of the fire. With these examples I shall close this section of my paper, and pass on to the more important one of considering the means of extinguishing fires.

Water is usually regarded as the "antagonistic element" to fire, and properly so, for although any fluid that will cut off the supply of oxygen essential to the support of combustion, will put out fire, water, from its cheapness and abundance, must always be the pre-eminent fire extinguisher. Many plans have been proposed for increasing the extinguishing power of water; acids, alkalies, neutral salts, and even clay have been successfully employed, but the difference in the extinguishing effect is so small as to be wholly unworthy of consideraon; in short, all such schemes are practically useless. Captain Manby, fifty years ago, advocated the use of an alkaline solution, projected from portable pneumatic fountains. A gentleman has very recently taken out a patent for a fire-extinguishing apparatus, in which water, charged with carbonic acid gas, is applied in a manner similar to Captain Manby's. Phillips' Fire Annihilator was invented a few years back, and is useful in contending with a fire in its earliest stages; beyond this, when tried, it has been practically found to fail.

The mode of applying water to extinguish fires received a great advance upon the introduction of leather hose by the brothers Van der Heide, at Amsterdam, in 1672. This contrivance enabled the stream of water to be conveyed a considerable distance from the engine, and directed upon the flames with great precision and effect. The practice first introduced by these Dutch firemen was that which the late Mr. Superintendent Braidwood so strongly inculcated upon all persons having charge of fire-engines. Up to the latter end of the last century, the mode of supplying water to fire-engines was principally by pouring it into the cistern from buckets, or from a fire-cock or standpipe; but as the engines became more numerous and competition increased, the engrossment of the water supply was not permitted; a plug being drawn the water ran free, and was collected in dams, made by breaking up the paving of the roadway, from whence the water was drawn through the suction pipe. The great improvements in the construction of engines and their appurtenances, especially the introduction by Simpkin, in 1792, of metallic valves instead of leather, permitted the use of suction pipes with advantage. In 1820, Mr. William Baddeley proposed to do away with the breaking-up of the roadway, a difficult and tedious operation, by placing a portable canvas dam or cistern over the plug hole, which collected a quantity of water for the supply of the engines without any trouble or loss of time. The prejudices of the firemen, however, were for a long time insurmountable, and it was not until the year 1836 that Mr. Baddeley's plan came into general use. In 1838 Mr. Baddeley received the silver medal of the Society of Arts for his invention (which is described in the Society's Transactions *), and his portable cisterns are now universally adopted.

In some experiments instituted by M. Von Marum, he found that water, directed upon a fire in its early stages, or when burning over an extended surface, and not in a mass, was most effective in the form of spray, and that a small quantity of water, so applied, sufficed to extinguish a very large burning surface. For the practical application of this principle we are likewise indebted to Mr. Baddeley, for he introduced a jet-spreader which could be attached to the ordinary branch nozzles, and brought into action by the pressure of the thumb on a small lever. The jet not being acted upon until it had left the nozzle, choking never took place, which was always the case when perforated nozzles were employed. This spreader has been found invaluable at agricultural fires, and is used with great advantage in horticultural engines. It is now pretty generally understood that large fires are unextinguishable; by some persons it is thought that water thrown upon them becomes decomposed and adds to the fury of the fire. It has not yet, however, been satisfactorily shown that any such effect takes place; but it is certain that the water is some way or other disintegrated without producing the least effect upon a furiously burning mass. This is particularly noticeable when a stream of water is directed over and into a lofty burning building of which the roof has fallen in, the divided state of the jet enabling it to be readily dispersed by the ascending column of heated air. The only chance of successfully coping with such a fire, is by attacking it at a low level, whence, either ascending or descending, the water may act beneficially. From the great apparent difficulty of successfully dealing with large fires, it is manifest that those plans will be most advantageous that can be applied at the commencement of a fire, and for this purpose the ordinary hand-pump cannot be surpassed. The great success which has attended its use both by firemen and civilians is, in many well-authenticated instances, truly marvellous. Many fires which, upon their first discovery, might have been covered by a hat, for want of such apparatus as a hand pump and a bucket of water, have grown into extensive conflagrations, entailing in many instances the loss of much valuable property.

The importance of receiving speedy information of the outbreak of a fire induced me to design a fire observatory, upon submitting which to Mr. Hodges, he immediately instructed me to erect one on his extensive premises, which has been executed, and was opened for work last August. It is constructed wholly of cast and wrought iron, the main mast being of wrought iron; its height is 135 feet, the diameter at top being 12 inches and at bottom 21 inches. It is passed through the building and bolted to

* Transactions, vol. 52, page 88.

a large wrought iron foundation plate at bottom; this fastening, together with wire rope shrouding and its own weight, relieve the building (which is a very old one) of any severe shock or strain from its oscillation in a heavy gale of wind. The means of ascent to the platform above are from the outside; the watchman steps into a cage (from which he cannot accidentally fall), and pulls on two rods run down the outside, holding the cage by lugs at the bottom; a chain is attached to the cage, which, in its turn, runs over a rigger and is fastened to a counter-balance weight running down the inside of the mast. Since its erection it has been on several occasions most useful in detecting the precise neighbourhood of a fire, and enabling Mr. Hodges' fire brigade to be first on the scene of disaster. It is proposed eventually to connect this observatory with neighbouring fire-engine stations by telegraph, so that an almost instantaneous turn-out of engines may be made on the discovery of a fire. The best means of arresting fires is a very wide question, as the only limit to the means is the expense. On the continent, generally, the whole is managed by government, and the firemen are placed under martial law, the inhabitants being compelled to work the engines. In London, the principal means is a voluntary association of the insurance companies, without legal authority of any sort, the legal protection by parish engines being, saving a few praiseworthy exceptions, a dead letter. Volunteer aid is also given in London, and several large establishments maintain fire brigades of their own. The foremost of these is unquestionably that belonging to the Lambeth Distillery, which is under the immediate personal superintendence of Mr. Frederick Hodges, who has devoted himself with extraordinary and unwonted energy to this subject. Then there is the True Blue Fire Brigade at Millwall, commanded by Mr. William Roberts, together with those belonging to Beaufoy's Distillery, Reid's Brewery, Price's Patent Candle Company, and the Notting-hill Fire Brigade, under Mr. Durnford; the Dock Companies also maintain Fire Brigades. In Liverpool, Manchester, Leeds, and other towns and cities, the extinction of fires by the pressure of water only, without the aid of fire-engines, is very much practised, and is found to be efficient and very economical, the pressure on the mains varying from 80 to 120 lbs. on the square inch, which is sufficient for all practical purposes to throw a jet over the highest of their buildings. The advantages of this high-pressure system are obvious, but to enable it to be universally adopted in London the whole water supply would require to be remodelled. In America the firemen are generally volunteers, enrolled by local government. They are exempt from military duty and service on juries, which appears to satisfy them, as the situation of fireman is eagerly sought in most of the American cities. It would be difficult to say which of these various systems is best; probably each is best suited to the place where it exists.

The deficient arrangements existing in London have for a long time been manifest. In the last session of Parliament the question was made the subject of official inquiry, when various witnesses were examined, the majority of whom were in favour of the Fire Engine Establishment being combined with the police. However, her Majesty's Government intend shortly to submit a Bill for largely extending the present arrangements to the consideration of Parliament.

The London Fire-Engine Establishment comprises thirty-nine hand-worked engines, one hundred and forty men, four land and two floating steam fire-engines. The manual engines, as you are doubtless aware, are drawn by horses to fires, where they are worked by men who receive one shilling for the first hour, or part of an hour, and sixpence for each subsequent hour, together with an "allowance" of a pint of beer per hour. This makes the working of fire-engines a favourite occupation with the "roughs," who can always be found in the street ready for an odd job. This arrangement relieves the London Fire Engine Establishment from the necessity of maintaining a permanent, large, and expensive force for the work in question. The whole police of the metropolis may likewise be said to be in the pay of the brigade. The policeman who, by the help of his feet and lungs, signals the approach of an engine, and clears the way, is sure of his five shillings; and a sovereign is ready for another policeman who, on the arrival of the engines at a fire, is found upon the spot guarding the door, and protecting the property endangered. In New York, a city which, although of but little more than one-third the size of the metropolis, has our full annual number of fires, the "fire department" numbers about 50 engines, and 4,500 volunteers, regularly organised. If we take, therefore, say 3,500 as the number of men which would be required to work the fire-apparatus of London as it should be, we can easily calculate what the maintenance of such a force would cost, unless, as in New York, we could command gratuitous assistance. In New York, however, the insurance companies have nothing whatever to do with the fire-engines, which belong to the city and are under the management of the municipal authorities. It must be borne in mind, however, that the London Fire Engine Establishment make no distinction, on an alarm of fire, between insured and uninsured property. It is adopted, as a maxim, that the insurance companies cannot afford to permit any fire to spread within the whole circle of their operations, and the freeholder who insures in Manchester, or in Edinburgh, as well as he who neglects to insure at all, alike enjoy the protection of the London offices in respect of the most strenuous efforts to preserve their property from destruction by fire.

In extinguishing fires of any magnitude the steam fire engine must ever hold the foremost place, not only on account of the development of power, but on the more important score of economy. A great check to their adoption and improvement in this country was the opposition so many years maintained by the London Fire Engine Establishment, acting under the advice of the late Mr. Braidwood, who subsequently became a warm advocate of steam fire engines.

The first steam fire-engine was constructed in England by Mr. John Braithwaite, in the year 1830; it was worked at the burning of the Argyll Rooms, the English Opera House, and several other large fires. It consisted of a 6-horse power steam-engine, and the pumps worked thereby, which were swung upon a carriage drawn by two horses. Steam sufficient for working could be obtained in the course of thirteen minutes. This engine particularly distinguished itself at the conflagration at Messrs. Barclay, Perkins and Co.'s brewery, for, after the fire, and the total loss of the steam-engine and pumping apparatus of the establishment, it rendered considerable service to the proprietors of the brewery in pumping for twenty-five days the beer brewed in the part of the building that was saved, to the vats, 50 feet above the level of the street. As the pump was 6½ inches diameter, and made 30·14 strokes per minute, it could pump in a day of ten hours 8,640 cubic feet, and in 25 days, 216,000 cubic feet of liquor to the height of 50 feet. Subsequently, Messrs. Braithwaite and Co. built three engines, one called the "Comet," for the Prussian Ministry of the Interior, which is still in existence at Berlin.

The Americans then took up the subject, and Captain Ericsson, an English engineer, obtained the gold medal offered in 1840 by the New York Mechanics' Institute, "For the best plan of a steam fire-engine," which was very similar to the engines of Mr. Braithwaite. Soon after this Mr. Paul R. Hodge built a steam fire engine in New York designed for auxiliary steam propulsion. About 1850, Mr. A. B. Latta, of Cincinnatti, U.S., constructed an engine, with self propelling gear, weighing 10 tons, which was guided, and in difficult places helped forward, by a pair of horses, their use being advocated on the ground that a machine running alone had a tendency to frighten other horses. Within a few years steam fire engines have

been adopted in Philadelphia, Boston, New York, Baltimore, and other cities of the United States; builders having variously and widely modified the earlier plans, whilst some have made entirely new ones. The main feature of all these plans is the boiler, which is constructed for the rapid generation of steam, and marvellous results have been obtained. Mr. Latta's engines have begun work in from three to five minutes from the application of the match. The engines built by the Amos Keag Company, of Manchester, New Hampshire, have begun in three and a-half minutes. Those of Messrs. Silsby, Mynderse, and Company, Seneca Falls, New York, have begun in five or six minutes. These differences are doubtless due to the varied amounts of heating surface each boiler presents. The engines of Messrs. Lee and Larned, of the Novelty Works, New York, are probably the most celebrated, and with good cause, as being remarkable for their strength, durability, and lightness, all being leading essentials in a successful fire engine. In these engines there is less water to heat, and their flues are extremely light, the grates are smaller than those of the Amos Keag engines, so that the time to make an effective fire is consequently greater, which is no very serious objection. The "Minnehaha" engine (of this make) has $201\frac{1}{2}$ square feet of heating surface, having 199 tubes of $1\frac{1}{2}$ inch diameter, and $\frac{1}{10}$th of an inch thick. The most celebrated engine of this make is that known as the "J. C. Cary." It is fitted with Mr. J. K. Fisher's steam-carriage apparatus, to enable it to be self-propelling. The boiler contains 114 pairs of vertical tubes, arranged annularly, or one within the other, the outer of $2\frac{1}{2}$ inch, and the inner $1\frac{1}{4}$ inch diameter, the annular space between the two being occupied by water. The steam cylinders are $7\frac{1}{2}$ inches diameter and 14 inches stroke. The connecting rods from the engines act on cranks placed upon an intermediate shaft, revolving in fixed bearings upon the frame, and operating the pump, which is one of Cary's patent rotary force pumps of the largest size; the total weight is about eight tons; the length of the frame or body is about $14\frac{1}{2}$ feet, its breadth 7 feet, and the total length of carriage $20\frac{1}{2}$ feet. Sufficient fuel for two hours consumption can be carried on the foot plate at the back of the hinder axle. Steam can be raised to working pressure in from six to ten minutes, but it is intended that steam shall be kept up at all times, so that the engine can start at a moment's notice, which can be done at a comparatively trifling cost. At a public trial on the 5th November, 1858, before Commissioner Cooper and other officials, it threw from 700 to 750 gallons of water per minute through a $1\frac{5}{8}$ inch nozzle a horizontal distance of 252 feet, and a vertical height of 160 feet.

Messrs. Shand and Mason, of Blackfriars, were the first to renew the manufacture of steam fire-engines in this country. Their first engine was constructed in 1858 for the Russian Government. A description of a public trial of this appeared in the *Times* newspaper of October 25th, 1858. Steam was generated to a working pressure in ten minutes from the application of the match and threw jets to a considerable elevation. The engine is now in use in St. Petersburgh. The second engine was tried at Waterloo-bridge Wharf, on the 1st July, 1859; a description of it appeared in the *Times* of July 2nd, 1859. Steam was generated to a pressure of 10lbs. in six minutes. An inch jet was thrown 90 feet vertically, and 130 feet horizontally. The third that was made was somewhat cumbrous, but was successful in working, which encouraged its makers to build another. Accordingly one was made, and purchased by the London Fire Engine establishment for their station in Watling-street. The boiler is a vertical one of peculiar construction, with a copper fire box, and Lowmoor shell plates of one quarter-inch in thickness; there are 199 tubes in the boiler, each 16 inches long by one inch in diameter, the boiler presenting a heating surface of 91·467 square feet. The cylinders are placed horizontally, the piston-rods being connected by a cross-head slotted to admit of the crank being actuated by its pin moving in the slide brasses. The steam cylinder is $8\frac{1}{2}$ inches diameter, and the pump cylinder 7 inches with a stroke of 9 inches. Steam can be raised to the ordinary working pressure (viz. 80 lbs. on the square inch), in 15 minutes from cold water. The weight, including water, fuel, and hose, is 6,500 lbs. Messrs. Shand and Mason have constructed three steam fire-engines for the London and North Western Railway Company, of the same dimensions as the last mentioned, but erected on an independent sole plate; they also constructed one similar to these (but fitted of course to a common road carriage), for the London Fire Engine Establishment. These makers took out a patent for a steam fire-engine. It consists of an upright conical steam generator, or boiler, formed simply of an external cone with an annular space between. The internal cone forms both fire-box and chimney. The hinder axle of the carriage is passed through the boiler by fixing a horizontal annular tube through the body of the boiler in a suitable position, the tube forming a water space in connection with the annular water space of the boiler. There are two single acting steam cylinders, and two single acting pump cylinders connected by tie-rods; the steam and water cylinders are cast in one piece. Messrs. Shand and Mason have made three of these engines, but in practice, owing to their mechanical design and construction, they are continually breaking down either at the crank-shaft or the plates of the boiler forming the top of the fire-box burn away, owing to there being no water circulation round them. The weight is very unequally distributed over the wheels, making the stern of the engine hang heavy. In consequence of the employment of a crank motion, these engines cannot be worked below a certain speed, owing to the difficulty of getting the crank over the centres.

Messrs. Merryweather and Son are now manufacturing steam fire-engines, and they have succeeded in bringing out two very good serviceable engines, named the "Deluge" and the "Torrent." The former of these consists of a vertical boiler, with a quantity of vertical copper tubes. The steam-chest at the top of the boiler is fitted with wrought-iron tubes for carrying off the smoke and creating a draught. Over the fire-box are a series of hanging tubes in which a perfect circulation of water is carried on. There is also an outer water jacket. The boiler is fed with one of Giffard's injectors. Steam is taken from four points, and supplied direct through the valve-chest into the cylinder, in its way passing under the cylinder. The steam cylinder is 9 inches in diameter, and 15 inches stroke; no fly-wheel is used, and by the valve arragement a uniform speed is obtained; this is a great advantage, as the pump is worked steadily, and an even column of water is delivered. The engine can be started, at any point, by opening the steam-valve, and can run at any required speed—a great desideratum in fire duty. The piston-rod is coupled to that of the pump direct, and the two guide-rods connect the pump and steam cylinder together. The pump employed is De la Hire's double acting, but the valves are placed in easily accessible chambers beneath the pump barrel. Provision is also made for completely emptying the barrel at every stroke, thus getting rid of all grit and impurities brought up through the suction. The piston is so constructed as to contain a quantity of oil, which continually lubricates the cylinder at every stroke. Air is contained in a sphere of elastic rubber within the air vessel, which prevents its total absorption. The internal diameter of the suction-pipe is five inches; the internal diameter of each of the two delivery-pipes is three inches. The weight of this engine with running gear complete is three and a-half tons. Steam can be raised from cold water to a pressure of forty pounds on the square inch in ten minutes from the application of the match. It has drawn water through the suction pipe vertically a distance of fourteen feet, and then discharged it over a building sixty feet high to a distance 210 feet through an inch and a-quarter nozzle. The

engine named the "Torrent," by the same makers, differs in a few details, and can be easily drawn by one horse. The steam cylinder is $6\frac{1}{2}$ inches diameter, with a 12-inch stroke. The pump is double acting, the same as used in the "Deluge," is $4\frac{3}{4}$ inches diameter, with a stroke of 12 inches; the two piston-rods being coupled directly, air-vessels are placed both on the suction side as well as on the deliveries. At a recent trial, cold water being used, a pressure of 37 lbs. of steam was raised in 8 minutes, and 100 lbs. in $9\frac{1}{4}$ minutes from the time of applying the match, and it is capable of discharging 250 gallons of water per minute to a height of 160 feet.

Mr. William Roberts, of Millwall, has constructed a very useful steam fire-engine, which can also be used as a hoist. The engine is 12 feet 6 inches long, by 6 feet 4 inches broad; the steam cylinders, two in number, are 6 inches diameter by 12 inches stroke, placed immediately in front of the boiler and over the shaft. The driving-wheels are 5 feet diameter, and each wheel has two springs, all being within the framing. The moving power is transmitted to the wheels from the main shaft by a pitch chain gearing, 4 to 1; either wheel can be thrown in or out of gear at pleasure by means of a clutch. The steering-wheel is 3 feet diameter, and will lock quite round, enabling the engine to turn completely round in its own length. The pumps are two of Mr. Roberts's Patent, $9\frac{1}{2}$ inches diameter, with a stroke of 8 inches each pump, and they can be very readily connected to the engine or thrown out of gear. The boiler is Benson's Patent, with water tubes, and forced circulation. The engine will carry 60 gallons of water in the tanks, 5 cwts. of coal, 24 feet of ladder (4 feet 6 inches in lengths), 12 feet of suction hose (24 feet if wanted), 40 feet of 4-inch delivery hose, and 450 feet of $2\frac{1}{2}$ inch ditto, 1 large and 4 small branch pipes, 12 buckets, and all the necessary tools, &c., the weight complete being 7 tons 15 cwts. On the end of the main shaft is a rigger, 2 feet in diameter, and a small windlass end to enable it to be used for driving machinery, hoisting, &c., and these are included in the weight of $7\frac{3}{4}$ tons. Steam can be fairly got up to 140 lbs. per inch in 19 minutes 25 seconds, with all coal, no wood being used except to light the fire in the first instance. With a $1\frac{1}{2}$-inch jet it has thrown the water a distance of 186 feet, and with a $1\frac{3}{8}$-inch jet a height of 140 feet; it is fitted with a regulator, so that it can be made to deliver the smallest quantity; with a jet $\frac{1}{64}$th of an inch it took 12 minutes 45 seconds to fill a quart measure. It can be made to use 2, 3, or 4 small jets instead of one large one when desirable to do so, and will deliver 450 gallons per minute. It has been propelled at a rate equal to 18 miles an hour, and has been taken through the High-street, Poplar, at from 12 to 14 miles an hour; it has ascended inclines of 1 in 14 with the greatest ease, stopping in the middle and starting again without difficulty. It has also been run over fresh Macadam road, and upon one occasion was taken to Woolwich and brought back, about three miles of road each way that had only just been made good from putting in the main sewer, the wheels sinking sometimes to a depth of 12 inches.

I have another engine to describe, and that shall be done in a few words. It is one invented by Mr. Wellington Lee, of the firm of Lee and Larned, of New York, and manufactured in this country by Messrs. Easton, Amos, and Sons, of Southwark. The boiler is of novel construction, and is composed of gun metal, steel and Lowmoor iron, with a view of obtaining the two essentials of lightness and compactness, securing at the same time a large amount of heating surface, of which there are 228·5 square feet, and of fire-bar surface 4·58 square feet. The boiler is composed of a central furnace, surrounded by a shell, or wall, of vertical water-tubes, surmounted by a steam-drum, which, in ordinary work, is filled with water to about one-third of its height; and from this chamber depends a flat water space, or "suspended slab," the connection with the steam drum being made by a series of vertical tubes. Through these proceed internal tubes by which the products of combustion pass in an intensely heated state to the smoke-box, exposing by this means an annular water space to the action of the heat. A number of short tubes pass, independently of these, through the suspended slab, and the steam drum respectively, through which the heated current also passes; and the entire arrangement is so adapted as to present the greatest possible amount of heating surface obtainable to the action of the fire. Tubes pass from the suspended slab to the water-bottom, into which the bottoms of the outer shell of tubes are secured, thus maintaining a complete circulation of the water throughout the boiler. The steam cylinders are two in number, and are placed immediately forward of the boiler; their diameter is 9 inches with a stroke of $9\frac{1}{4}$ inches, the two piston-rods are coupled direct. The slide valve of one cylinder is actuated by means of a reducing lever placed on the piston-rod of the other cylinder, and operates in such a manner, that when one piston is at the end of the stroke, the other is at half stroke, and *vice versa.* This arrangement while ensuring the correct action of the slides for admitting and exhausting the steam, is not of itself sufficient to ensure the proper length of stroke, but avoids the breaking of piston or cylinder cover which might perhaps occur. To guard against this, two additional parts are provided, so arranged, that the exhaust is imprisoned shortly before the termination of the stroke, and the piston starts smoothly and evenly on its return, and however rapid may be the running, the motion is as certain and even as in two engines working with cranks at right angles upon one shaft. The pumps are two in number, each $5\frac{5}{8}$ inches diameter; but the plungers and seats may be changed in about twenty minutes for others of larger diameter, in case a greater quantity of water may be required. The length of stroke is $9\frac{1}{4}$ inches diameter, and being double acting, a steady and continuous stream is obtained from them. Each pump has eight suction and eight delivery valves of india-rubber working upon gun metal guards, offering an effective water way of fifteen square inches (in four valves), or very nearly two-thirds the area of the piston for the contents of one pump. The largeness of the water ways, combined with the peculiar stop at the end of each stroke, which is a main feature of the slide valve motion, causes the almost instantaneous closing of the valves, and the pumps run free from concussion or vibration at any practicable velocity. The net area of the suction opening is 16 square inches, and, having a continuous stream passing through it, the hose remains steady and quiet when the pumps are running at their highest velocity; moreover, advantage is taken of the hollow spaces of the hand railing to connect them with the suction valve chamber, so as to form a suction air vessel. The engine is hung upon a wrought-iron framing, forged entire. Fisher's busk springs, as offering the greatest elasticity and lightness, are employed, with relieving screws for locking them out of gear when working. The nett weight of the engine is 3 tons $2\frac{1}{2}$ cwt. Steam has been raised in five minutes.

Having received Mr. Hodges' directions to design a steam fire-engine, I carefully examined the plans of all the steam fire-engines that have been made. I came to the conclusion that Lee and Co.'s pumps were practically the best, but was not prepared to say their boiler was. I designed the engine as shown in the diagram on the wall. The plan of the boiler I am not at present prepared to make known, and it will be seen that I use a springing fore-carriage, composed entirely of one flat spring, fastened at one end, and allowed to play at the other. I use by preference four 3 inch deliveries, and one 6 inch suction. The steam cylinders are $8\frac{3}{4}$ inches diameter by 9 inches stroke, and the pump cylinders 5 inches diameter by 9 inches stroke. On the top of the pumps is arranged a box for carrying hose and other implements, serving at the same time as a seat for the driver and two firemen, and behind, a standing

room for three firemen, whilst the stoker and engine driver will ride on the foot plate behind.

I now come to a description of steam fire-engines used for service on the water, and here Mr. Braithwaite was also the first to advocate their use, for he designed a floating engine, and submitted it to the London Fire Engine Establishment in 1836.* Previous to the year 1852, the most powerful fire engines in London were two floating ones on the river, belonging to the London Fire Engine Establishment. The largest of these was worked by 120 men, and, when well manned, was a very effective machine. The great increase, however, in the size of the dock and waterside warehouses, led in that year to an alteration in this engine, whereby the apparatus for manual power was removed, and steam power substituted, doubling the power of the engine. The advantages accruing from this proceeding were so manifest that, in 1855, the directors of the London Fire Engine Establishment caused an entirely new floating steam fire engine to be constructed. This was accordingly designed and constructed by Messrs. Shand and Mason, and has at various large fires performed efficient service. The steam-engines propel the boat by means of two stern jets of water, thrown by a centrifugal pump; they are nominally of 80 horse-power, but are frequently worked up to double that amount. It has two steam cylinders, each 14 inches diameter, and water cylinders of 10 inches, with a stroke of 18 inches. Two donkey engines are erected on the sides, to supply the boilers with water.

At the great fire in Tooley-street, this engine worked 384 consecutive hours. The London Fire Engine Establishment have recently had alterations made in the mode of propelling this boat, which may, I think, be termed most unsatisfactory. The propelling jets are now projected above the water, and against the air only. Action and re-action being in all cases equal, and the resistance of water being greater than that of air, it is manifest that the alteration just made, at a very considerable expense, is an injudicious one. I witnessed a trial of her powers, and the conclusions I formed were, that her speed was diminished, and the supposed improvements made her sluggish at the stern, taking over five minutes to turn round. Messrs. Merryweather and Son constructed two very efficient steam fire-engines, which are fixed in the tug boats on the river Tyne. They were designed by Mr. Edward Field, C.E. They are fixed in the fore part of the tug boats, and connected to the ordinary boiler used for propelling. The steam being always kept up for shipping emergencies, it will be seen that these engines are ready at a moment's notice. Each engine consists of two inclined steam cylinders, each 16 inches diameter and 12 inches stroke, both working direct on to one crank, from which the piston rods of the pump are worked. The pumps are of gun metal, and are 9 inches diameter by 10 inches stroke. The usual working speed is from 60 to 80 revolutions per minute, with a steam pressure of but 17 lbs. per square inch. These engines have been found to deliver continuously a steady stream of 1⅛-inches in diameter to a distance of 163 feet, and a 1¼ inch stream to a distance of 134 feet. For fire duty, two ⅞ inch nozzles are generally used, and are found very effective. They were designed to occupy a very small space, being only 8 feet long by 2 feet 6 inches wide. Working with a higher pressure of steam these engines would, of course, give greater results.

Mr. William Roberts has fixed in the tug boat *Lucy*, belonging to the West India Dock Company, a steam fire-engine, in which he uses his patent pumps.

In bringing my paper to a close, I can only assure you that it was with considerable diffidence I approached a subject of such magnitude; but feeling the great importance of it to a great commercial community, and having had practical opportunities of making myself acquainted with the subject through all its minute details and workings, I was desirous of addressing this Society, and, through it, the public generally. I trust my labour has not been in vain. Should there be in any portion of the paper any errors, either of detail or judgment, I am open to conviction from the gentlemen who will take part in the discussion, if they can adduce sufficiently good proof in support of any disputed point. At this juncture, I wish to convey my thanks to Messrs. Hodges, Baddeley, Braithwaite, and the fire-engine makers for their courteous attention and kindness in supplying me with information. I will now leave the subject in your hands, trusting that it may be discussed in a fair and candid manner.

Table of Results of Actual Public Trials of Steam Fire Engines.

Engine Makers.	Steam Pressure.	Horizontal Distance.	Vertical Height.	Size of Jet.	Number of Gallons delivered.
Messrs. Easton, Amos, and Sons. (Lee and Co.'s Patent.)	120 lbs. 140 ,,	222 ft. 202 ,,	175 ft. 160 ,,	1¼ in. 1½ ,,	448 gallons in 1 minute 5 seconds, through 1½-inch jet.
Messrs. Merryweather and Son.	120 lbs. 140 ,, 145 ,,	215 ft. 220 ,, 190 ,,	165 ft. 170 ,, 150 ,,	1¼ in. 1¼ ,, 1½ ,,	448 gallons in 1 minute 11 seconds, through 1⅜-inch jet.
Messrs. Shand and Mason.	120 lbs. 150 ,,	190 ft. 220 ,,	150 ft. 170 ,,	1¼ in. 1¼ ,,	448 gallons in 1 minute 15 seconds, through two 1-inch jets.

DISCUSSION.

Mr. F. Hodges, responding to the call of the chairman, said that Lee's boiler for steam fire-engines, which had lately been brought out in this country, was a very good one. The only question with him was whether it was not a little too complicated as regarded the tubes, which from their arrangement appeared likely to require frequent cleaning out. The working of it, as far as he had seen at present, was very satisfactory. He should be glad to hear what Mr. Lee had to say about it.

Mr. Lee had not intended to have said a word upon this subject, but having been called upon he would say, in reply to what had fallen from Mr. Hodges, that he did not regard the fact of employing a great number of tubes in his boiler as any evidence of complication. The tubes were placed one inside the other, but the junctions of the tubes were made as easily as in any other arrangement.

* See *Mechanic's Magazine*, vol. 26, page 18, where this engine is described and illustrated.

With regard to their requiring to be frequently cleaned out, experience showed that that was not the case, as he had had some of these boilers in use for six years without requiring cleaning. The action through the tubes was so rapid, and the circulation of the water through them so strong, that there was no opportunity for matters to settle in them.

Mr. Hodges said he should be glad to hear from Mr. Roberts a description of Benson's boiler, which he believed that gentleman had used in his own engine.

Mr. Baddeley said Mr. King had given a description of Messrs. Titus Salt and Co.'s fire-proof mill at Saltaire, which appeared to be constructed on a very good principle, but there was a more recent plan of fire proof building, which he thought superior. He alluded to Bunnett's fire-proof floor, which was composed of bricks geometrically formed, so as to interlock with each other, an arrangement which enabled the floor to be made either slightly convex, or completely flat, and the straining of the walls was prevented by tie rods embedded in the bricks. Mr. Bunnett had constructed a floor of that description at Deptford, which had been tested as to its strength, and also as to its fire-proof qualities, and the non-conducting power of the bricks was such that, with the largest fire they could place beneath it, it was impossible to ignite sulphur or gunpowder on the upper side of the floor. It appeared to him to be the most perfect fire-proof floor he had ever met with. The plan described in the paper as that of Mr. Beattie, of carrying pipes round the room and discharging water from various points, was by no means a novel one, having been mentioned in the works of Sir William Congreve, since which time it had been the subject of two or three patents; but in practice it had not been found so valuable as in theory it might appear to be. Since the disastrous fire in Tooley-street the public mind had been very much directed to this subject, and there had been a general leaning towards providing against the recurrence of a similar catastrophe; but he was afraid the more important point of prevention in the early stages of fires had been, to a great extent, overlooked. In its early stage, fire, in most cases, was quite manageable, and that was the time at which it could be dealt with with the greatest chance of success. Of all the modern inventions for fire extinguishing purposes, nothing, in his opinion, was so really useful as the little hand-pump. Many years of controversy ensued before the late Mr. Braidwood could be brought to regard the hand-pump with favour. The first trial that gentleman made with the hand-pump was with an old one, which was constructed previously to the fire of London, and belonged to the parish of St. Dionis, Backchurch. He believed there were five still remaining out of half-a-dozen of those pumps made originally, but the trial of that hand-pump led to the construction of an apparatus of the same description, which kept up a continuous stream of water, and the results of the experiments with those little hand engines were so satisfactory that every fire-engine in London travelled with one, and they had been the means, in the hands both of firemen and civilians, of saving thousands of pounds worth of property. Mr. King had alluded to the question of economy in the arrangements for extinguishing fires, and he (Mr. Baddeley) thought this question had never yet been fairly considered. The work of fire extinction in the metropolis being for the most part in the hands of wealthy bodies, they had not studied the question of economy, but when the matter was to be taken up by the public, this became a question of considerable importance. In Liverpool, Manchester, and other large towns, water, furnished at high pressure from the mains, had been found both efficient and economical. In some parts of London the pressure on the mains was quite sufficient for the extinguishing of fires without the use of engines. In Islington the fire-engine was very seldom employed. The hose was attached to a stand-pipe, from which a jet of water from thirty to forty feet high could be obtained, and this was sufficient. There was, however, great prejudice against this plan on the part of the superintendents of the London Fire Brigade; it was not looked upon as an orthodox mode of proceeding; and some of the district superintendents would sooner pay out of their own pockets the expenses of working an engine, than resort to the stand-pipe and pressure from the mains. He believed that, with regard to the great majority of fires in London, the pressure of water from the mains would be sufficient for their extinction if applied at once. He had seen four brigade engines set to work to extinguish a penny bundle of wood which had become ignited under the cellar stairs of a public-house, whilst at the same spot the pressure in the mains was sufficient to throw a stream of water forty feet high. It became an important public question, how far greater economy might be introduced into the fire-extinguishing establishments of London. The other portions of Mr. King's paper appeared so satisfactory as to call for no remark.

Mr. Wm. Roberts said there were but few statements in the paper with which he did not entirely agree, but upon one or two points he did not concur with Mr. King. He did not agree with him that it was generally understood that large fires were inextinguishable. He had had some experience, during twenty-four years, as a volunteer fireman, and had had a brigade of his own during the last four or five years. There were few people who had not heard of that unfortunate locality with regard to fires, Millwall. A few years ago it was notorious for the number of fires that occurred there, but now a fire there was a rarity. Previously to the establishment of his own brigade, the nearest fire-engine station was about 3½ miles distant; the consequence was, a fire had time to get a-head before any water could be put upon it. He had been present with his brigade at fires which at first threatened to be serious. He might especially mention a fire which broke out at a rope factory, in which there were stored about thirty tons of tarred hemp, ready for spinning, and, although it was well alight, the fire was stopped before the arrival of any of the London Brigade engines. He agreed with Mr. King that there was a mistake in the mode of attacking fires. Many persons attacked them from the top, his own plan was always to set to work at the bottom. He never threw water upon the top unless it was to prevent the fire spreading to the next house. He had succeeded in extinguishing a fire at a paraffin oil factory, where 1,000 gallons of oil escaped from a still, and this fire was subdued in twenty minutes, and they were coiling up their hose when the first London Brigade engine arrived at the spot. For the last 18 months only one serious fire had occurred in the Isle of Dogs. He recommended all persons who carried on dangerous trades to have the water laid on to their premises from the mains with stand pipes. There were very few chemical works in his own neighbourhood which were not so provided, and the workmen were periodically drilled in the running out of the hose from the stand pipe, and in all the operations necessary for subduing a fire. His own experience had been, that in the majority of instances all fires were extinguishable if properly attacked. With regard to the steam fire-engine, it was a subject to which he had devoted considerable attention for many years. Seven or eight years ago he offered to make a steam fire-engine at his own cost, and permit the London Fire Brigade the free use of it for a certain period; but the late Mr. Braidwood was then opposed to the use of steam, as he considered the water supply of London was insufficient for it, but it was found that the supply was quite sufficient for a moderate sized steam fire-engine. With regard to Benson's boiler, to which Mr. Hodges had alluded, it was properly speaking a Latta boiler. Benson's boiler was a water-shell with a quantity of tubes inside it, and a pump was employed to circulate the water through the tubes which were always supposed to be filled. He was sorry to say he had a great deal of trouble with his engine in the first instance, but by the introduction of some modifications in

the boiler, the steam was raised as well as he could desire. It was stated that in America the steam was got up in these boilers in from four to five minutes. If that could be done in America he saw no reason why it should not be done in England; but he had never seen a boiler yet that would do it. A reckless American suggested that the fire should be lighted first, and the water introduced when the boiler was hot, and that so the steam could then be got up very quickly, but he had too much regard for his personal safety to follow that advice. With cold water in the tubes he could not get the steam up to working pressure in less than twenty minutes, but by banking up the fire with small coal he could keep the water warm for a great many hours, and could then raise the steam in four minutes, and in five minutes he had 100 lbs. of steam and was running along the road. He had only seen experiments with Lee's boiler upon one occasion, and then it took twenty minutes to get up the steam. Mr. King considered he had designed a better boiler, and he heartily wished him success. It was stated in Mr. King's paper that he (Mr. Roberts) fitted the tug *Lucy* with a steam fire-engine. That was not quite correct. Three or four years ago, he was called upon to put a pair of his pumps into the *Lucy*, to be worked by the ordinary engines of the boat; this he did, and they proved to be some of the most powerful pumps ever constructed, and were capable of delivering 30 gallons of water per stroke, through a 2½-inch hose, to a distance of 210 feet, and he believed the West India Dock Company at the present moment possessed the most powerful floating fire-engine in London.

Mr. Glass was inclined to think this was more a chemical question than a mechanical one. They had spoken entirely of the application of water by mechanical means, in a fluid state, to the extinction of fires. The great object, in a chemical point of view, was to deprive the materials in combustion of the elements which most contributed to combustion. If the oxygen of the atmosphere were withdrawn, they had then carbonic acid, nitrogen, and watery vapour, all of which tended to extinguish fire. Mr. Phillips, in his fire annihilator, had employed carbonic acid with a certain amount of success ; but perhaps the quantity employed was not sufficient. If, however, this could be supplied in sufficient quantity, no doubt any fire could be extinguished by it. His own impression was that the better way of applying water would be in the state of high pressure steam. If steam were allowed to rush into the lower part of a burning building, he thought that would be the most effectual way of extinguishing the fire. The object was to substitute another atmosphere for that of oxygen, and that could be done by high pressure steam, which would reduce the temperature of the burning materials below that which was necessary for combustion ; or the oxygen of the atmosphere might be absorbed by the combustion of a carbonaceous material. The object for which he principally rose was to suggest the application of high pressure steam to the extinction of fires.

Mr. Roberts said he had applied steam in the way suggested in several cases during the last twelvemonths; there was, however, some difficulty in getting an apparatus that was easily manageable. He had partly designed an engine in which either steam or water might be used. The suggestion was made to him some eighteen months ago by the Chairman of the West India Docks.

Mr. Glass added that he thought the addition of a salt of ammonia to the water employed for extinguishing fires would tend to increase its efficacy.

The Chairman said he saw present Mr. Porter, a gentleman from New York, and after having heard of the excellent organization which existed in that city for the extinction of fires, he was sure any particulars that could be given on that subject would be highly interesting to the meeting.

Mr. Porter said his attention had never been very closely drawn to the steam fire engines in New York, so as to enable him to speak of them in any detail, and he had only that general knowledge of them which any tolerably well-informed citizen might be supposed to possess. His friend Mr. Lee, as the manufacturer of between 60 and 70 steam fire engines, which were used in all the principal cities of the United States, was especially qualified to give them the particulars of their construction. He wished to remark, with respect to the trial of Mr. Lee's steam fire-engine on the premises of Mr. Hodges, that using water in the boiler at a temperature of 44 degrees, the steam began to rise in 6 minutes and a quarter. At that time an inconsiderate fireman put a quantity of coke on, which nearly extinguished the fire, and under those circumstances it was 20 minutes before a pressure of 40 or 50 lbs. was obtained. He regarded that as an exceptional case. He had seen a working pressure obtained in that boiler in about ten minutes with all the tubes filled with water.

Mr. Philip Palmer said there was one important question to be solved, that was—the best mode in which all these valuable appliances could be brought into practical operation, or into one common centre. He had been connected with one of the oldest fire offices in London, as a director, for nearly twenty years, and was gratified to hear the testimony that had been borne by Mr. King to the services rendered by the London Fire Brigade. The great question to be solved was whether that brigade was sufficient for the public service, and whether it was in a position to command those valuable inventions and appliances which had been brought under their notice this evening. They had the eminent services of such men as Mr. Hodges and Mr. Roberts in connection with the brigades which those gentlemen had organised; but notwithstanding all the individual energy that was displayed, they sometimes read accounts in the newspapers which showed that some more perfect and combined organisation was required. Now was the time for discussing what was the best system that could be introduced for protecting London from the ravages of fire. He was sorry that the discussion had been almost entirely on the construction of engines and similar matters of detail, because it appeared to him that the most important part of the question was in what way these valuable appliances could best be brought to bear. He could not agree with the remark of Mr. Baddeley, that in the operations of the London brigade the question of economy was not regarded by the fire offices by which it was supported. He had always considered that economy was a great point with them, and this was a question which had in some degree led to the introduction of a bill in parliament on the subject. He should be glad to hear the opinion of Mr. King, if he had formed one, as to the best way in which these various appliances could be practically brought to bear upon the public service. Speaking individually, he preferred that the government should have nothing to do with the matter, because, if they had, he thought it might not to be so well managed as it was now. He should like to see some popular system established, still under the management of the fire offices, or at any rate that they should have a share in its direction.

Mr. Wentworth Scott said, reverting to the chemical portion of the subject, he would warn them against the use of carbonate of ammonia in the water used for the extinction of fires, as, so far from becoming decomposed by coming in contact with incandescent surfaces, it would produce a vapour very offensive to the eyes and noses of all persons near it. Some years ago, during the Russian war, he made experiments upon various highly inflammable substances, including phosphorus, and was therefore solicitous to provide himself with the means of extinguishing a fire, in case it should arise from such very combustible materials. A very few experiments sufficed to convince him that, whilst water did very well for extinguishing fire upon a solid incandescent substance, it had no effect whatever upon flame such as that of burning turpentine or tallow. This could only be extinguished by bringing an antagonistic vapour to bear upon it. The idea of changing the atmosphere within an ignited building might look well on paper, but was very difficult of accomplish-

ment. The action of the flames caused such an intense draught through the building, and the consumption of atmospheric air was so enormous that the entire atmosphere would be changed several times in the space of a minute. Let them judge then of the difficulty—not to say the impossibility—of changing the atmosphere of a burning house in the way that had been suggested. There were some substances known to chemists which would produce the effect described upon the oxygen of the atmosphere. Prussic acid was one; but he should not be inclined to recommend the vapour of that acid for extinguishing fires. But chloroform might be used with great effect, and without the like injurious results. When mixed in small quantities with water—from two to three per cent. —and injected upon any kind of burning material, it acted very efficiently by cooling the hot solid particles, and rendered the air incapable of supporting combustion. It would extinguish flames which water, as water, could never do.

Mr. H. W. Reveley, seeing so many persons present who were acquainted with the management of fires, begged to inquire whether the firemen were drilled to attack the fire "between wind and water" as it was termed, because that would put a fire out more rapidly. The fire must be attacked at the root of the flame, and the jet should be moved along as the flame became gradually extinguished, driving, as it were, the flame before it.

Mr. Olrick gave some explanations of the boiler invented by Mr. Field, and used in Merryweather's steam fire-engine, and mentioned some points of excellence which he considered it possessed over some other descriptions of boilers.

After a few remarks from Mr. Inglis and Mr. Stabler,

Mr. King, in reply upon the discussion, said there were but few remarks which called for any observation from him. In his description of Mr. Lee's boiler, he intended no disparagement to it as a boiler, but he thought it was too complicated in its parts, and too expensive in its manufacture, to be practically of service in steam fire-engines. With regard to the remark of Mr. Roberts, that he considered large fires extinguishable, that gentleman had not given them any instances of large fires which he had extinguished, and he apprehended his successful encounters with fires had been when an early attack was made upon them. With reference to the suggestion of Mr. Glass, as to the use of high pressure steam, he thought there was a great deal in it, but it was difficult to design an apparatus suitable for applying the steam. He had only now to thank the meeting for the kind manner in which his paper had been received.

The Chairman said, before he asked the meeting to agree to a vote of thanks, which he was sure would be heartily accorded to Mr. King for the able paper he had read, he would make one or two very brief remarks. He would reply to the observations of Mr. Palmer by saying, it appeared to him that the subject that gentleman alluded to had been scarcely touched upon this evening. They had been considering the various practical means by which fires might be put out, but they had scarcely touched upon the question of how these various means could be best applied. He thought that was a subject of great importance in the metropolis; but it was a large question, and would require a great deal more discussion than they were able to give it this evening. He begged Mr. Palmer to understand that he did not undervalue the importance of that subject, although the present discussion had hardly touched upon it. This question would be well worthy of consideration on a future occasion, and he should be glad to take part in any discussion that might arise upon it. It must always be remembered, that however valuable the services of private individuals might be, they could not always depend upon having such men as Mr. Hodges and Mr. Roberts at their command. London had derived the greatest benefit from the services of those and other gentlemen, but from nobody more than from Mr. Hodges. The public spirit he had shown—the way in which he had administered his really large establishment of fire-engines, entirely under his own direction, was not only highly creditable to himself, but eminently useful to this city; but such men were not always to be found, and therefore the subject of making provision for the greater security of life and property in London was one which should not be lost sight of. It was high time that the public roused themselves, in order to put the establishment of the fire brigade of the metropolis on a more permanent, more secure, and more efficient footing; and he begged to add, in using the term "efficient," he did not, for a moment, disparage the services of the late Mr. Braidwood, or those of Capt. Shaw, the present chief of the London Fire Brigade. Both were as good men as could be found, and he believed the London Fire Brigade was at the present moment in as efficient a state as was possible under the circumstances, but still it had not that perfect organisation which he thought was necessary in a metropolis like this. That was a subject, however, on which he would not now make more than a passing remark. The gentleman who had spoken with regard to the modes of using chemical substances for the extinction of fires, he thought ought always to recollect how difficult it was in small country towns and villages to have anything but the simplest contrivances; and therefore, however valuable many of these schemes might be theoretically, and however clearly they might be proved to be efficient, if directed by an able chemist, still in the hands of inexperienced persons in the country, those appliances might prove to be total failures. What they should consider in London was, in what way these appliances so ably introduced to their notice could be best brought into use for the benefit and security of life and property. With regard to the construction of engines, the name of Mr. Lee was worthy of the highest mention as having been the manufacturer of those efficient engines which were brought under public notice in the inquiry made last year before a Parliamentary Committee. They had this evening heard some remarks from Mr. Baddeley, who, he believed was connected with, and had rendered most efficient service to the public through that valuable institution known as the Fire Escape Association. That was an institution which, by the most simple means, had rendered, and was still likely to render, great public services; for the first duty was—as he was sure it always would be—in the case of fire, to protect human life. He could not forbear to call attention to that institution, knowing, as he did, its great value. He would conclude by asking the meeting to agree with him in expressing their warmest thanks to Mr. King for the valuable paper he had read to them.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 25th March, a paper by Mr. Clements R. Markham, F.S.A., "On the Supply of Quinine, and the Cultivation of the Chinchona Plants in India," would be read. On this evening Thos. King Chambers, Esq., M.D., will preside.

THE TURKISH INDUSTRIAL EXHIBITION.

The *Times* correspondent gives the following account:—

Those of your readers who have visited Constantinople will remember to have seen—and others who have not had such an opportunity will have read or heard of—the famous Hippodrome or Atmeidan. This place, connected with so many historical associations, both ancient and of our own time, although divested of its primeval splendour, is still one of the most interesting sights of Stamboul. In

addition to the monuments of antiquity with which it abounds—such as the Obelisk of Theodosius, the Serpentine Column, and the remains of the walled Pyramid, which all stand in a line, describing the axis of the ancient circus—it has other advantages which peculiarly fit it for the purpose for which it has now been selected. In its immediate vicinity, and within full view, St. Sophia and the magnificent mosque of Sultan Achmet, which now occupies a portion of the original circus, stand out in bold and majestic relief. A number of hovels and dilapidated buildings, it is true, rather mar the general effect, but not to the extent of diminishing or effacing its beauty. This square, which so often witnessed revolts among the Janissaries and also the commencement of their extermination, has now been appropriated as the arena for the more peaceful purposes of an industrial and commercial competition. The unpretentious but not ungraceful structures which have been erected in the centre of the square consist of a principal building and an annexe, the two being intersected by the granite obelisk. As it was impossible to provide the necessary amount of space without encroaching on some of the monuments, the Serpentine Column was included bodily in the annexe, in the centre of which it stands, enclosed by an iron railing, a grim reminiscence of antiquity frowning on steam monsters in the form of locomotives, steam-engines, and other such practical encroachments of the present times over the past. The whole building comprising the annexe covers an area of 12,000 Turkish *pics*—something over two acres. It is a mixture of Turkish and Moorish architecture, with an Alhambric porch, and forms altogether a very pleasing and light structure. The main building consists of four aisles, in the centre of which there is an Oriental Court, with marble fountain, and a profusion of plants and exotics. The whole is glazed on the top, to admit sufficient light.

Before proceeding, however, with any description of the interior of the building and its contents, it is well to state briefly the origin of the undertaking itself. By many people the first idea is attributed to the Sultan. Others affirm that it originated with Nazim Bey, a son of Fuad Pasha and chief Ottoman Commissioner to the London Exhibition of 1862. Be that as it may, the Sultan has given the greatest encouragement to the scheme from the first, and has, even in his over-eagerness to see it in operation, exercised such pressure on those connected with its details that, although the building has been opened to the public for a week, the arrangements are still involved in the greatest confusion, and it will be a long time before it assumes anything like completeness.

Although receiving every assistance from the Government, including, it is said, a pecuniary subvention, the undertaking is the result of private speculation; and I fear that the Commission, in its eagerness to secure a commercial success, will lose sight of the other and more important interests which such an enterprise should have in view. A certain sum of money was subscribed by the different members of the Commission, which is to cover the expense of the building and the purchase of most of the objects to be exhibited. It must not be imagined, nor would it be reasonable to expect, that in such a vast empire, a great proportion of which is in a state of barbarism, the same appreciation of the benefits and advantages resulting from an Industrial Exhibition is felt by the people of this country, as that which animates the trading and industrial classes in Europe. If reliance had been placed upon any such spontaneous contribution, the chances are that the walls of the Exhibition would have remained bare. It was necessary, therefore, for the most part, to purchase the articles worthy of show; and it is to be feared that, in the interest of economy and of their pockets, the Commissioners have not made such a selection, in all cases, as would properly represent the capabilities of the country. The power with which the Commissioners were invested by the Government, in the furtherance of the scheme, has, moreover, it would seem, been used by them, or more probably by their agents in the provinces, in an arbitrary and unwarrantable manner, in extorting from the tradespeople their productions at prices below their real value. The natural consequence is, that it created a disinclination on their part to dispose of their best articles, and the show from the provinces, which might have been so beautiful and interesting, has fallen far below the general expectation. To purchase cheap and sell dear in such an instance is not the best means to encourage the trading classes, or to demonstrate to them the advantages of a public Exhibition.

In their natural ignorance and inexperience of such a matter, it would have been the duty of the Commissioners to call in the assistance of a certain number of practical and intelligent Europeans to lay down the general principles and assist in carrying out the difficult details of such an enterprise, the complicated nature of which requires the most perfect organisation. It should also have been the duty of the Government to insist upon the adoption of a system which, without interfering with the legitimate interests of private speculation, should have secured a public value and a statistical result. I fear that these important considerations have been, in a great measure, neglected and overlooked. In their self-sufficiency and impatience of European control, the Turks determined to carry out the work unassisted. At the outset, and at the suggestion of a French scientific gentleman, it was determined that a similar system to that pursued in England and France should be adopted, separating the contributions of the different provinces, so as to show the comparative capabilities of each, and then into classes and sections. The Exhibition was to have been divided into 14 different classes. Under his guidance and supervision the classification was proceeding satisfactorily, when suddenly the system was abandoned as too cumbrous, and the consequent disorder and confusion set in which I apprehend it is now too late to remedy. The catalogue, which should contain upwards of 15,000 different numbers, is proceeding at the rate of from 50 to 100 a-day; so that there is a probability that it will not be completed by the time the Exhibition closes. It seems, moreover, that the Sultan issued orders for the opening of the Exhibition on a certain day, giving three days' time to complete all the arrangements. As it is difficult to reason with Sultans and dangerous to trifle with their commands, however unreasonable and arbitrary they may be, no representation was made to him as to the incompleteness of the work; and on Friday last, the day fixed by him, the Turkish Industrial Exhibition was opened by the Sultan in person. A week before the public, and even the Commissioners themselves, did not believe it possible that it could be opened before one month. Contrary to general expectation, no great solemnity was observed on Friday last. The Diplomatic Corps even were not invited to be present. It seems that the great ceremony is deferred to the time of the distribution of awards and prizes. There was no one present but the Commissioners and the Turkish Ministers. The Sultan walked round the building and expressed his approval of the arrangements. He bestowed a valuable jewelled watch on Fuad Pasha, as a *souvenir* of the occasion. He does not seem to have paid much attention to anything in particular, with the exception of a crayon copy of a drawing representing a mounted Mameluke in all the excitement of battle. The original, by Horace Vernet, is well known, and lithographic copies of it abound on the Boulevards in Paris. This sketch seems very much to have struck his fancy, for on retiring to the elegant kiosk which is set apart for him in the building, and from a latticed balcony of which he can command the whole Exhibition, he asked that it should be brought to him. He left the building after some time, and has since repeated his visit on two occasions.

It is now time to look into the interior of the building, and give a general idea of its contents and appearance. After all the defects in management

which I have pointed out, one is agreeably surprised by the *coup d'œil* obtained inside. The general arrangements and disposition of the various articles have been carried out with a degree of taste and judgment which I have much pleasure in recording. It is true that the very first impression produced is that a great deal in the way of utility has been sacrificed to show. Nor must one be too hard upon the Commissioners for this. It is so much in the character of Orientals that it could hardly be expected that they would have departed from the rule on an occasion like the present. All their gorgeous and glittering productions—the magnificent carpets and rugs of Anatolia and Smyrna; the silver and gold brocades of Aleppo, Damascus, and Bagdad; the richly embroidered prayer carpets and tapestries of Brussa; the smart costumes of Janina and Albania; the gaudy-coloured tissues of the Imperial factory; a costly collection of pipes, tastefully arranged in a trophy; the beautiful silver filagree ornaments of Tunis and Tripoli; last, but not least, a selection of Palace and Crown jewels, valued, I am informed, at upwards of two millions sterling—these are the things which first meet and enchant the eye; while the more profitable and more important productions of the country are huddled together out of sight, so as not to disturb the harmony and magnificence of the general effect. The inexhaustible fertility of the soil is represented by the cereal productions of the country, a great portion of which, alas! for want of roads, rot on the place of their growth. The silk cocoon, so important a source of revenue to the government, the wool, the cotton, the productions of their olive woods, the incalculable riches of their virgin forests, and a thousand other valuable productions too numerous to be recorded here—all these are but poorly represented, and difficult to be found. Enough is seen of them, however, by those who look with a critical and observing eye, to show the great wealth of the country, and the enormous productive and commercial importance with which a proper administration might so easily endow it.

Considering the apathy of Orientals in such things, a very good attendance has been secured since the opening, which goes on increasing. On the first two or three days the people admitted averaged 3,000. Yesterday 5,000 visited the building, which was not very crowded. Wednesdays and Saturdays are reserved for ladies only. The price of admission is 6d., excepting on Wednesdays and Fridays, when it is 1s.

It is curious to see the variety of Oriental costume among the visitors. Turks of the old school in their sober pelisses and white or green turbans, swarthy Arabs in gaudy-coloured robes, Persians in their high conical caps, Circassians in their beautiful costume—all these, contrasting so greatly with the uniform and uninteresting garb of a European crowd, tend, together with the peculiar decorations of the building, to invest this exhibition with a picturesque effect quite refreshing to Europeans.

In a future letter, I will describe such of the contents as are worthy of notice.

INSTITUTION OF NAVAL ARCHITECTS.

The Ordinary Meetings for 1863 will be held in the great room of the Society of Arts, on Thursday, 26th March, morning at 12, and evening at 7 o'clock; Friday, 27th March, morning at 12, and evening at 7 o'clock; and Saturday, 28th March, morning at 12 only. The Right Hon. Sir J. S. Pakington, Bart., M.P., G.C.B., D.C.L., President, in the chair.

The following is the programme of proceedings:—

Thursday, March 26.

The following Papers will be read and discussed:—

Morning Meeting, at 12 o'clock.

"On the Naval Architecture of the Exhibition of 1862." By Vice-Admiral Paris, C.B., of the French Imperial Navy; Assoc. I.N.A.

"On the Construction of Iron-plated Ships." By W. Fairbairn, Esq., LL.D., F.R.S., Hon. Assoc. I.N.A.

"On Iron-plated Ships." By. J. D'A. Samuda, Esq., Mem. Council I.N.A.

"On the Present State of the Question at issue between Modern Guns and Iron-coated Ships." By J. Scott Russell, Esq., F.R.S., Vice-President I.N.A.

Evening Meeting, at 7 o'clock.

"On the Steering of Ships." By N. Barnaby, Esq. M.I.N.A.

"On Copper and other Sheathing for the Navy." By W. J. Hay, Esq., F.C.S., Assoc. I.N.A., Chemical Lecturer, Royal Naval College, Portsmouth.

Friday, March 27.

Morning Meeting, at 12 o'clock.

"Experiments at Sea with a Rotating Ship Clinometer." By Professor C. Piazzi Smyth, F.R.S., &c., Astronomer-Royal of Scotland.

"On the Rolling of Ships as influenced by the Disposition of their Weights." By J. Scott Russell, Esq., F.R.S., Vice-President I.N.A.

"On the Resistance of the Medium as Limiting the Angles of Rolling." By W. Froude, Esq., Assoc. I.N.A.

"On Isochronism of Oscillation in Floating Bodies." By W. Froude, Esq., Assoc. I.N.A.

"On Iron-clad Sea-going Shield Ships." By Capt. Cowper P. Coles, R.N., Assoc. I.N.A.

Evening Meeting, at 7 o'clock.

"On the Construction and Support of Iron and other Masts and Spars." By Charles Lamport, Esq., Assoc. I.N.A.

"On an Improved Method of Framing Iron Bulkheads." By G. C. Mackrow, Esq., Assoc. I.N.A.

"On the Protection of Iron from Oxidation and Fouling." By W. J. Hay, Esq., F.C.S., Assoc. I.N.A., &c.

Saturday, March 28.

Concluding Meeting, at 12 o'clock.

"On the Education of Naval Architects in England and France." By J. Scott Russell, Esq., Vice-President, I.N.A.

"On the Origin and Construction of Her Majesty's Yacht *Fairy*." By T. J. Ditchburn, Esq., M.I.N.A.

"On an Instrument for Measuring the Strain on Ships' Cables." By T. M. Gladstone, Esq., C.E.

"On a Curious Form of Differential Wave in a Stratified Fluid, with an Experimental Illustration." By W. Froude, Esq., Assoc. I.N.A.

The offices of the Institution are at 7, Adelphi-terrace, Strand, W.C.

INSTRUMENT FOR SOUNDING ALARUMS AND ACTUATING VENTILATORS.

The object of the apparatus, the invention of Mr. George Hawkesley, is to sound an alarum, or open a ventilator, when the temperature of a room is increased beyond that at which the apparatus is set to go off. A strip of metal, which expands freely with heat, by preference of zinc, is attached at one end to a screw or other instrument, capable of being moved or adjusted; the other end is attached to the shorter end of a lever mounted to a fixed centre, and to the longer end of it is attached one end of another expansion strip, and the other end of this second strip is attached to the shorter end of a second lever, which in turn has a third expansion strip attached to it, and so on, the number of the strips employed depending on the degree of delicacy required in the instrument. The last of the series of levers is connected with a spring or other

suitable instrument, which keeps the expansion strip at all times in a state of tension. The last of the series of levers carries the instrument which acts on the detent or stop of the sounding apparatus, or of the power apparatus for working the ventilator, and such last lever is made with a point, which moves over or opposite a graduated scale commencing at zero, and so divided that if the lever by the screw or adjusting apparatus is moved to a particular degree or division on the index the apparatus will go off when the heat rises to that extent above the temperature at which the thermometer stood at the time of setting the apparatus.

Home Correspondence.

INTERNATIONAL TRANSIT THROUGH CENTRAL AMERICA.

Sir,—After the very able paper read by Captain Pim, on the 11th inst., and the discussion upon this subject by many eminent men, it would seem almost superfluous to offer any further opinion, but some very strong points appear to have been entirely lost sight of on that occasion.

Presuming, of course, that the undertaking is to be international, the amount of capital required is not an object of so much importance as that it shall be economically expended, having due regard to the permanent benefit of the world at large.

Now there is no doubt whatever, that a clear ship passage would be infinitely superior to a railway, a mere apology for a truly paying commercial transit, especially with a line of 225 miles, when the shortest distance across the isthmus is only 27½ miles, and in that respect I entirely agree with what fell from Mr. Parke Pittar on that evening.

The objections to a ship canal are:—The supposed difference of level of the two seas, material time required for execution, the great expense, and bad harbours at each end.

The first difficulty, namely, difference of level, is a bugbear already discarded by all scientific men, or is reduced to that caused by winds and tides—we hear nothing now of such an obstacle in the works of the Suez Canal. When opened, the tide will either flow alternately in both directions, when ships may choose their time of passing, or it may flow constantly in one direction, and powerful steam-tugs, as in all cases, will readily accomplish the passage.

The estimate for the time and expense required will be much reduced by an accurate survey of the various possible shortest lines, which, in all probability, will not exceed double the shortest known distance across, or from forty to fifty miles; and the expense will only be that of forming an open tidal communication between the two seas of the smallest dimensions, when the tidal flow, either or both ways, will soon form a ship canal, or, rather, strait, amply sufficient for ships of the largest class. The expense, however, will necessarily be increased if it be found impracticable to avoid rocky ground, as the force of gunpowder must then be largely employed.

The last objection, namely, bad harbours or shoal water, at either or both entrances, has no foundation in fact, for, of course, a rocky coast will be avoided, while the rush of the tide—especially if assisted by rough stone jetties thrown down at random, in a proper line, on one or both sides of each entrance if required, will soon clear out the straits, and cut a deep channel at each end. No such difficulty will be found when the Suez Canal shall be completely opened to the tidal flow, notwithstanding the miles of shoal water now existing at both ends.

The examples of the Isthmus of Corinth, and the former attempts at Suez, are nothing to the point. There is a mountainous district at Corinth, which the feeble efforts of the Greeks were unable to contend with, and the old Suez Canal was merely an artificial communication with the Nile, when of course no tidal current could be established to clear out and widen the passage.

I am, &c.,

HENRY W. REVELEY.

Reading.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. 1. Major F. J. Goldsmid, "Memoranda on a March from Kurrachee to Gwadur, on the Mekram Coast, in the cold season of 1861-62." 2. Dr. Duncan Macpherson, "On the Harbour of Sedashagur."
British Architects, 8.
Medical, 8½. Mr. W. J. Coulson, "A Case of Obturator Hernia—Operation."

Tues. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. 1. Mr. J. G. Fraser, "Description of the Lydgate and of the Buckhorn-Weston Railway Tunnels." 2. Mr. W. M. Peniston, "The Public Works in the Province of Pernambuco, Brazil."
Zoological, 9.
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."
Anthropological, 7½. 1. Captain R. F. Burton, "A Day amongst the Fans." 2. Prof. Raimondi, "Indian Tribes of Loreto, North Peru."
Architectural Museum, South Kensington, 7½. Mr. A. J. Beresford Hope, "On the Condition and Prospects of Architectural Art."

Wed. ...Society of Arts, 8. Mr. Clements R. Markham, F.S.A., "On the Supply of Quinine, and the Cultivation of the Chinchona Plants in India."
R. Soc. Literature, 4½.
Archæological Association, 8½. 1. Mr. Pettigrew, "On Thuribles." 2. Mr. Cuming, "On Ancient Snuffers."

Thurs...Royal, 8½.
Antiquaries, 8½.
Philosophical Club, 6.
Artists and Amateurs, 8.
Royal Inst., 3. Dr. E. Frankland, "On Chemical Affinity."

Fri.......Royal Inst., 8. Mr. W. Crookes, "On Thallium."
R. United Service Inst., 3.

Sat.......Royal Inst., 3. Professor Max Muller, "On the Science of Language."
Royal Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 20th February, 1863.

22. Bill—Post-office Savings Banks.
Brazil (British Barque *Prince of Wales*, and her Majesty's Ship *Forte*—Correspondence.
Census of England and Wales, 1861 (Population Tables)—General Index.
Commerce of Naples—Despatch.

Copies of the undermentioned Papers, presented by Command, will be delivered to Members of Parliament applying for the same at the Office for the Sale of Parliamentary Papers, House of Commons:—

1. Agricultural Statistics (Ireland)—Abstracts 1862.
2. Factories—Reports of Inspectors to 31st October, 1862.

Delivered on 21st and 23rd February, 1863.

33. Ticket-of-Leave Prisoners—Return.
45. Trade and Navigation Accounts (31st December, 1862).
49. Dulwich College—Return.
50. Railway and Canal Bills—First Report from the General Committee.
51. Navy (Promotion and Retirement)—Return.
52. Appropriation Act—Copy of Treasury Minute.
25. Bills—Register of Voters.
26. ,, Partnership Law Amendment.
30. ,, Prince and Princess of Wales' Annuities.
Duchy of Cornwall—Report from the Council of H.R.H. the Prince of Wales.

Delivered on 25th and 26th February, 1863.

10. Greenwich Hospital—Return.
53. National Debt (Savings Banks, &c.)—Return.
60. Atlantic Royal Mail Steam Navigation Company—Return.
63. Malt—Return.
64. Malt Bonded—Return.
33. Bill—Bills of Exchange and Notes (Metropolis).

Delivered on 27th February, 1863.

59. Poor Law (Ellen Kane)—Correspondence.
61. Queen Anne's Bounty—Account.
66. Ashton-under-Lyne Union—Return.
35. Bills—Security from Violence.

37. Bills—Malt Duty (amended).
Brazil—Further Correspondence.
29. Railway and Canal, &c., Bills (1. Alyth Railway; 2. Andover and Redbridge Railway; Anglesea Central Railway; 3. Bala and Dolgelley Railway; 4. Barnsley Coal Railway; 5. Belfast, Holywood, and Bangor Railway; Berks and Hants Extension Railway; 6. Bishops Waltham Railway; Blackburn Chorley, and Wigan Railway; 7. Bristol and Exeter Railway; 8. Caledonian Railway (Bredisholm Deviation), (Carstairs and Dolphinton Branch), (Granton Branches), (Improvements, &c.); 9. Carmarthen and Cardigan Railway (No. 1 and No. 2); 10. Central Wales Extension Railway; 11. Charing-cross Railway; 12. Cleveland Railway; 13. Cockermouth and Workington Railway; Cockermouth, Keswick, and Penrith Railway; 14. Cowes and Newport Railway; 15. Dublin, Wicklow, and Wexford Railway; 16. Dulas Valley Mineral Railway; 17. Dundee and Perth and Aberdeen Railway; 18. Ely Valley Extension Railway; 19. Esk Valley Railway; Evesham and Redditch Railway; 20. Farnborough and Aldershott Railway; 21. Fochabers and Garmouth Railway; 22. Glasgow and South Western Railway (Additional Powers), (Capital); 23. Great Eastern Railway (Chatteris and Ramsey Branch); 24. Hadlow Railway; 25. Hammersmith and City Railway; 26. Hereford, Hay, and Brecon Railway; Herne Bay and Canterbury Junction Railway; 27. Kettering and Thrapstone Railway; 28. Kington and Eardisley Railway; 29. London and North Western Railway (New Branch Lines); 30. London and South Western and Andover and Redbridge Railway);—Board of Trade Reports.

Delivered on 28th February and 2nd March, 1863.
41. Revenue Departments—Accounts.
50 (1). Railway and Canal Bills—Second Report from Committee.
67. Sugar and Molasses—Return.
68. Galway Subsidy—Copy of a Letter.
2. Schools (Scotland)—Returns.
21. East India (Army)—Return.
47 (1). Committee of Selection—Second Report.
70. Fisheries (Ireland) Bill (1842)—Minutes of the Proceedings of the Select Committee.
40. Bills—Marriages, &c. (Ireland).
42. ,, Salmon Exportation.
34. ,, Writs Prohibition.
Russia (Regulations in regard to Trade with the Eastern Coast of the Black Sea)—Correspondence.
29. Railway and Canal, &c., Bills (31. London and South Western Railway; 32. Manchester, Buxton, Matlock, and Midlands Junction Railway; 33. Merthyr, Tredegar, and Abergavenny Railway; 34. Mid Wales Railway (Branch, &c.), (Capital); 35. Mistley, Thorpe, and Walton Railway: 36. Newport Pagnell Railway; 37. Newtown and Machynlleth Railw y (Capital, &c.); 31. Northampton and Banbury Junction Railway; 39. North British Railway (Wansbeck, &c.); 40. North Eastern Railway; Newcastle and Starbeck Branches); 41. Okehampton and Lidford Junction Railway; 42. Ramsey and St. Ives Railway; Rickmansworth, Amersham, and Chesham Railway; 43. Saffron Walden Railway; 44. Scottish Central Railway and Dundee and Perth and Aberdeen Junction; 45. Scottish North Eastern and Dundee and Arbroath Railway; 46. Shrewsbury and Welchpool Railway; 47. South Staffordshire Railway; 48. Stonehouse and Nailsworth Railway; Stourbridge Railway; 49. Vale of Llangollen Railway; 50. Ware, Hadham, and Buntingford Railway; 51. West Hartlepool Harbour and Railway; 52. West London Extension Railway)—Board of Trade Reports.

Delivered on 3rd March, 1863.
56. Revenue Departments—Estimates.
69. West India Islands, &c., Relief—Account.
38. Bills—Telegraphs (amended).
43. ,, Innkeepers' Liability (No. 2)
44. ,, Union Relief Aid Act (1862) Continuance (amended.)
Brazil—Further Correspondence.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, March 13th*, 1863.]

Dated 10th December, 1862.
3315. W. Clark, 53, Chancery-lane—Imp. in umbrellas. (A com.)

Dated 26th December, 1862.
3354. J. Farley, Bolton-le-Moors, Lancashire, and J. Crowther, Bradford, Yorkshire—Certain imp. in steam engines and apparatus connected therewith.

Dated 9th February, 1863.
356. J. Macintosh, North Bank, Regent's-park—Imp. in obtaining and applying motive power.

Dated 14th February, 1863.
411. F. E. Walker, James's-terrace, Waterloo-road—Imp. in the construction of breech-loading fire-arms.

Dated 20th February, 1863.
460. W. Marsden, 49, Old Bailey—Imp. in envelopes.

Dated 25th February, 1863.
528. T. V. Lee, 6, Bank-chambers, Lothbury—Imp. in machinery for digging, compressing, and moulding peat or turf, and for retorts and kilns for drying peat or turf, and making peat or turf charcoal through the agency of hydro-caloric or superheated steam, and for collecting the products of distillation whilst charring the peat or turf.
532. J. Inglis, Edinburgh—Imp. in machinery or apparatus for folding paper and other fabrics or materials.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

608. P. Adie, Strand—Imp. in means and apparatus for measuring angular and actual distances.—4th March, 1863.
658. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the treatment of certain fibrous vegetable substances with a view to the production of textile materials therefrom. (A com.)—9th March, 1863.

PATENTS SEALED.

[*From Gazette, March 13th*, 1863.]

March 11th.
2532. E. Balmforth.
2534. H. M. Radloff.
2535. J. Webster.
2542. W. Clark.
2543. R. Moreland, jun.
2549. R. Cranston.
2574. J. Imray.
2576. C. Chinnock.
2577. G. Maw.
2601. J. Farran.
2653. J. L. Hughes.
2691. W. Taylor and S. Buckley.
2694. J. Bradbury and W. Bradbury.
2997. A. V. Newton.
3240. H. Wilde.
3276. J. Burchall & E. Borrows.
128. W. Hulse & C. L. Haines.
March 13th.
2533. W. L. Tizard.
2540. G. L. Lee.
2547. L. Leigh.
2553. J. Douglas.
2560. W. H. Browne and H. Armstrong.
2570. D. C. Bridge and J. Dyson.
2575. R. R. Jackson & J. Coupe.
2581. B. Hotchkiss.
2613. T. Kennedy.
3257. J. Biggs, J. Johnson, T. Richardson & T. Arnold.

[*From Gazette, March 17th*, 1863.]

March 17th.
2571. J. B. Giertz.
2583. J. Wilson.
2584. A. Prince.
2588. J. Long.
2590. M. Vogl.
5596. J. J. N. Micas.
2607. R. R. Jackson and Æ. I. Jackson.
2626. E. Dixon.
2672. W. Clark.
2713. A. V. Newton.
2726. J. H. Johnson.
2749. A. V. Newton.
2753. G. Haseltine.
2767. C. Harratt.
2880. T. G. Ghislin.
3164. G. Ranson.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, March 17th*, 1863.]

March 9th.
638. J. Lister and J. Lees.
656. M. J. E. Jullienne.
March 11th.
732. T. Sykes, B. C. Sykes, and J. W. Crossley.
March 12th.
719. J. H. Heal.
March 13th.
675. M. Henry.
679. J. H. Johnson.
680. I. Horton and I. Kendrick.
702. W. Wood.
707. E. Cope, W. Cope, and W. G. Ward.
773. J. H. Johnson.
March 14th.
697. W. Hudson and C. Catlow.
703. T. Richardson.
717. W. Cl rk.
734. W. Spence.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, March 17th*, 1863.]

March 11th.
612. T. Porter.
635. C. B. Normand.
March 12th.
631. C. Randolph and J. Elder.
March 13th.
625. E. T. Wri ht.
1984. W. H. Perkin.
March 14th.
622. C. Coates.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4543	March 12.	Improved Fire Escape	George Clarke	Marchmont-street, London.
4544	,, 16.	Improved Grindstone Spindle, with adjustable Flanges	Walter Henry Phillips	Birmingham.
4545	,, 17.	Casing for Fire-places	Stephen Proctor	Elsecar, near Rotherham, Yorks.

Journal of the Society of Arts.

FRIDAY, MARCH 27, 1863.

COMMITTEES OF REFERENCE.

The Committee on Agriculture met on Friday, the 20th inst., Sir Thomas Phillips, Chairman of the Council, in the chair. The Chairman invited the Committee to suggest subjects in connection with agriculture, including agricultural machinery and implements, tillage, drainage, manures, and new crops, to which the attention of the Society might advantageously be directed. Various subjects were then put forward by different members of the Committee, in respect of which it was considered the Society might usefully act, as well as others for which premiums might be offered by the Society, and it was arranged that a circular should be sent to each member of the Committee, inviting further suggestions in relation to the premium list about to be issued by the Society.

PRIZES FOR ART-WORKMANSHIP.

The Council have appointed a Committee, consisting of Messrs. John Bell, Bowler, Colin Minton Campbell, Henry Cole, C.B., J. G. Crace, W. Dyce, R.A., F. Elkington, C. D. Fortnum, George Godwin, F.R.S., Peter Graham, C. Hart, W. Hawes, W. Holland, M. D. Hollins, John Hunt, Owen Jones, Marsh Nelson, T. G. Parry, F. Pellatt, Sir Thomas Phillips, F.G.S. (Chairman of Council), Messrs. Richard Redgrave, R.A., R. Riviere, Skidmore, F. G. Stephens, Godfrey Sykes, J. Webb, and M. Digby Wyatt, to consider and report what prizes the Society should offer for the encouragement of art-workmanship applicable to manufactures, and, upon the recommendation of that Committee, the Council have decided to offer prizes for the successful rendering of designs in the undermentioned processes of manufacture, according to the directions detailed in each case. These will shortly be published.

1. Modelling in terra cotta, plaster, and wax.
2. Repoussé work in any metal.
3. Hammered work in iron, brass, or copper.
4. Carving in ivory.
5. Chasing in metal.
6. Enamel painting on metal, copper, and gold.
7. Painting on porcelain.
8. Inlays in wood (marquetry or buhl), ivory, or metal.
9. Engraving on glass.
10. Embroidery.

The designs will be by artists of great reputation, to be translated into the various modes of workmanship, and photographs and castings of such designs will be sold by the Society, at the Society's House, at cost price, to persons desiring to be competitors.

The works to be executed will be considered to be the property of the producers, but will be retained for Exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

The exhibitors will be required to state in each case the price at which their works may be sold, or if sold previously to exhibition, at what price they would be willing to produce a copy.

The awards in each class will be of two grades, and the prizes specified in each class will be given, provided the works be considered of sufficient merit to deserve them; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

Before the award of prizes is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

STREET ILLUMINATIONS AND DECORATIONS.

The Council have appointed a Committee to consider and report what awards may be offered by the Society for practical suggestions to improve street illuminations and street decorations for *fêtes*.

SOCIETY OF ARTS EXAMINATIONS, 1863.—NOTICE TO LOCAL BOARDS.

The Previous Examinations by the Local Boards should be held forthwith, so that the Form 2 (see Programme) may be returned by the 1st April.

Any Local Boards expecting to have candidates desiring to be examined in Music, should apply to the Secretary of the Society of Arts without delay, who will furnish them with a form of test to be used at the Previous Examination in that subject, as explained in Par. 111 of the Programme.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office

order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,
P. LE NEVE FOSTER, *Secretary.*

The subscription of each member is limited to one guinea.

The following is the list of subscribers up to the 26th inst.:—

Abbott, Major-General Sir Frederick, C.B.	£1	1	0
Adams, Thomas	1	1	0
Adams, George G.	1	1	0
Adams, George William	1	1	0
Addington, Right Hon. Henry Unwin	1	1	0
Adley, Charles Coles	1	1	0
Akroyd, Edward	1	1	0
Alger, John	1	1	0
Allen, Thomas	1	1	0
Allison, George	1	1	0
Ames, John	1	1	0
Anderton, James	1	1	0
Andrew, W. P.	1	1	0
Asprey, Charles	1	1	0
Artingstall, George	1	1	0
Atkins, George James	1	1	0
Atkins, John P.	1	1	0
Atkinson, William	1	1	0
Austin, James	1	1	0
Avery, Thomas Charles	1	1	0
Bacon, Jacob Perkins	1	1	0
Bagnall, Charles	1	1	0
Balleras, Guillermo Esteban	1	1	0
Barber, Charles	1	1	0
Barry, Dykes	1	1	0
Bartholomew, C.	1	1	0
Bartlett, William E.	1	1	0
Bateman, J. F.	1	1	0
Baume, Celestin	1	1	0
Baylis, W. Henry	0	10	6
Bazley, Thomas, M.P.	1	1	0
Beckwith, Edward Lonsdale	1	1	0
Belcher, Rear-Admiral Sir Edward	1	1	0
Bell, John	1	1	0
Bentley, Robert J.	1	0	0
Best, Hon. and Rev. Samuel, M.A.	1	1	0
Betts, Edward Ladd	1	1	0
Beyer, Charles F.	1	1	0
Birkett, John	1	1	0
Bischoff, James	1	1	0
Black, Alexander	1	1	0
Blagden, George	1	1	0
Blaine, Delabere Roberton	1	1	0
Bodkin, William Henry	1	1	0
Boileau, Sir John P., Bart., F.R.S	1	1	0
Bonnewell, William Henry	1	1	0
Bosanquet, George Jacob	1	1	0
Bowley, Robert K.	1	1	0
Boyd, James	1	1	0
Braby, Frederick	1	1	0
Branston, Robert Edward	1	1	0
Brassey, Thomas	1	1	0
Breillat, E.	1	1	0
Bremner, Samuel	1	1	0
Brett, John W.	1	1	0
Brickwood, John Strettell	1	1	0
Bright, Sir Charles	1	1	0
Broad, Robert	1	1	0
Brook, Charles	1	1	0
Brooke, Charles, F.R.S	1	1	0
Brooke, John	1	1	0
Brookes, William	1	1	0
Brooks, Henry	1	1	0
Browell, Edward M.	1	1	0
Brown, Henry	1	1	0
Brown, Sir William, Bart.	1	1	0
Browne, Edward	1	1	0
Budgett, John P.	1	1	0
Burgoyne, Gen. Sir John F., Bart., G.C.B., F.R.S.	1	1	0
Burton, William S.	1	1	0
Cama, M. H.	1	1	0
Candy, Charles	1	1	0
Caplin, Madame R. A.	1	1	0
Capper, Walter	1	1	0
Champion, Percival	1	1	0
Chance, Robert Lucas	1	1	0
Charlton, Henry	1	1	0
Chater Joseph	1	1	0
Chester, Harry	1	1	0
Christie, Robert Monro	1	1	0
Clabon, John M.	1	1	0
Clark, Daniel Kinnear	1	1	0
Clutton, John	1	1	0
Cock, John, Junr.	1	1	0
Coghlan, H. T.	1	1	0
Cohen, Henry Louis	1	1	0
Cole, Henry, C.B.	1	1	0
Colman, Jeremiah James	1	1	0
Cooper, William	1	1	0
Cope, Walter	1	1	0
Corbett, John	1	1	0
Corderoy, Edward	1	1	0
Cosens, Frederick W.	1	1	0
Coulson, William	1	1	0
Courtauld, Samuel	1	1	0
Cowie, Thomas S.	1	1	0
Creed, Henry	1	1	0
Critchett, Charles (Assistant Secretary)	1	1	0
Cubitt, William	1	1	0
Cullingford, W. H.	1	1	0
Cunningham, H. D. P., R.N.	1	1	0
Curling, Joseph	1	1	0
Curtis, William	0	10	6
Crawford, Robert Wygram, M.P.	1	1	0
Darby, Abraham	1	1	0
Davenport, Samuel Thomas (Financial Officer)	1	1	0
Davidson, Thomas	1	1	0
Dawbarn, George	1	1	0
Dawbarn, Richard W.	1	1	0
Dawbarn, Robert	1	1	0
Dawson, Henry	1	1	0
Day, William	1	1	0
Deane, Edward	1	1	0
Debary, Peter Francis	1	1	0
Dickson, Peter, F.R.G.S.	1	0	0
Dilke, Sir C. Wentworth, Bart.	1	1	0
Dilke, Charles W.	1	1	0
Dillon, John	1	1	0
Dines, George	1	1	0
Dix, Thomas	1	1	0
Dixon, Thomas	1	1	0
Docker, F. W.	1	1	0
Dowleans, A. M.	1	1	0
Drax, J. S. W. S. Erle, M.P.	1	1	0
Duncum, Charles	1	1	0
Dunn, Thomas	1	1	0
Dutton, William C.	1	1	0
Eamonson, Joshua J.	1	1	0
Eastham, John	1	1	0
Easton, James	1	1	0
Easton, Percy Shand	1	1	0
Ebury, Lord	1	1	0
Elliot, William Henry Fletcher	1	0	0
Ellis, William	1	1	0
Ethelston, Rev. Charles Wickstead, M.A.	1	1	0
Evans, E. Bickerton	1	1	0
Evans, Jeremiah	1	1	0

Ewart, William M.P.	1	1	0
Faraday, Michael, D.C.L., F.R.S.	1	1	0
Faulkner, John, Junr.	1	1	0
Fauntleroy, Robert Thomas	1	1	0
Field, John	1	1	0
Field, William	1	1	0
Fladgate, William Mark	1	1	0
Foley, Lord	1	1	0
Fordham, Thomas	1	1	0
Foster, P. Le Neve (Secretary)	1	1	0
Fowke, Captain Francis, R.E.	1	1	0
Fowler, Robert N.	1	1	0
Fox, Sir Charles	1	1	0
Freer, Rev. Richard Lane, D.D.	1	1	0
Fussell, Alexander	1	1	0
Gadesden, Augustus William	1	1	0
Garling, Henry	1	1	0
Geeves, William	1	1	0
Gibson, Henry	1	1	0
Gilbart, James William, F.R.S.	1	1	0
Goding, Charles	1	1	0
Godwin, George, F.R.S.	1	1	0
Gonzaga, H. S. H. the Prince Alexander of, and Duke of Mantua	1	1	0
Gooch, Joseph H.	1	1	0
Gooch, Thomas	1	1	0
Goode, Thomas	1	1	0
Gordon, Col. W. J., C.B., R.E., D.A.G.	1	1	0
Gould, Charles Augustus	1	1	0
Graham, Peter	1	1	0
Graham, Thomas, D.C.L., F.R.S.	1	1	0
Graham, William	1	1	0
Grant, Alexander	1	1	0
Grey, Major General the Hon. Charles	1	1	0
Grove, W. R., Q.C., F.R.S.	1	1	0
Gruneisen, Charles Lewis	1	1	0
Hack, Thomas	0	10	6
Haden, F. Seymour, F.R.C.S.	1	1	0
Hall, Walter	1	1	0
Hamilton, Edward	1	1	0
Hamilton, Sir Robert N. C., Bart.	1	1	0
Hammond, William Parker	1	1	0
Hammond, W. Parker	1	1	0
Hancock, James Lyne	1	1	0
Hancock, Frederick William	1	1	0
Hanhart, Michael	1	1	0
Hannay, John	0	10	6
Hannay, Robert	1	1	0
Hannay, Robert, Jun.	0	10	6
Hannay, Thomas	0	10	6
Hannington, C. S.	1	1	0
Hardy, Commander R. W. H., R.N.	1	1	0
Harrison, Henry	1	1	0
Harrison, Thomas E., C.E.	1	1	0
Hawes, William	1	1	0
Hawkshaw, John, F.R.S.	1	1	0
Hayward, T. Carlyle, Jun.	0	10	6
Headland, Edward	1	1	0
Heal, John Harris	1	1	0
Heane, Henry	1	1	0
Heather, James	1	1	0
Hereford, the Dean of	1	1	0
Heymann, Lewis	1	1	0
Heywood, James	1	1	0
Hick, John	1	1	0
Hicks, Thomas	1	1	0
Hill, Charles	1	1	0
Hollins, Michael Daintree	1	1	0
Holmes, Alfred William	1	1	0
Holmes, Herbert Mountford	1	1	0
Holmes, James	1	1	0
Hooper, Bartlett	1	1	0
Hooper, George Norgate	1	1	0
Horner, Edward	1	1	0
Horton, Isaac	1	1	0
Horton, John	1	1	0
Howard, Philip Henry	1	1	0
Howard, Thomas	1	1	0
Imhof, Daniel	1	1	0
Jackson, Richard M.	1	1	0
James, Jabez	1	1	0
James, Jabus Stanley	1	1	0
Jellicoe, Charles	1	1	0
Jewesbury, H. W.	1	1	0
Joel, Joseph	1	1	0
Johnson, Henry	1	1	0
Johnson, Jabez	1	1	0
Jones, James W.	1	1	0
Jones, Owen	1	1	0
Jones, Richard Lambert	1	1	0
Keeling, Herbert Howard	1	1	0
Kelk, John	1	1	0
Kemp, George T.	1	1	0
Khaznadar, S. E. le Général Moustapha, Premier Ministre de S.M. Tunisienne	1	1	0
Lacy, Henry Charles	1	1	0
Lambert, Thomas	1	1	0
Larnach, Donald	1	1	0
Lavanchy, John R.	1	1	0
Lawrence, Frederick	1	1	0
Le Couteur, Col. John, F.R.S.	1	1	0
Leeks, Edward Frederick	1	1	0
Leighton, John, F.S.A.	1	1	0
Levi, Leone	1	1	0
Lewis, Stephen W.	1	1	0
Lezard, Joseph	1	1	0
Linnington, A. H.	1	1	0
Lister, John	1	1	0
Longstaff, G. Dixon, M.D.	1	1	0
Lovegrove, James Samuel	1	1	0
Lovegrove, Samuel	1	1	0
Lowe, George, F.R.S.	1	1	0
Lucas, Thomas	1	1	0
Macarthur, Major-Gen. Sir Edward, K.C.B.	1	1	0
MacDonald, J. C.	1	1	0
Macfarlane, Walter	1	1	0
Mackrell, W. T.	1	1	0
Maclaran, George	1	1	0
Maclea, Charles G.	1	1	0
Malcolm, Major-Gen. G. A.	1	1	0
Manby, Charles, F.R.S.	1	1	0
Manchester, the Bishop of, F.R.S.	1	1	0
Marryatt, Joseph	1	1	0
Marsh, Matthew Henry, M.P.	1	1	0
Martin, John	1	1	0
Martin, Thomas	1	1	0
Martineau, David	1	1	0
Martyn, Silas Edward	0	10	6
Matthew, James	1	1	0
May, Harry	1	1	0
Mayor, Right Hon. the Lord	1	1	0
McMurray, William	1	1	0
Mechi, Alderman	1	1	0
Merle, William Henry	1	1	0
Metchin, W. P.	1	1	0
Middleton, David	1	1	0
Miles, Alfred W.	1	1	0
Mocatta, Benjamin	1	1	0
Moore, Charles	0	10	6
Morant, Robert	1	1	0
Moule, John	1	1	0
Moulton, Stephen	1	1	0
Muir, William	0	10	6
Mulready, William, R.A.	1	1	0

Munn, Major W. A.	1	1	0
Murchison, J. H.	1	1	0
Murchison, Sir Roderick Impey, K.C.B., D.C.L.	1	1	0
Napier, Robert	1	1	0
Navroji, Dádábhái	1	1	0
Newcombe, S Prout	1	1	0
Noble, Matthew	1	1	0
Oastler, Jonah	1	1	0
Oldershaw, Capt.	1	1	0
Owen, Professor Richard, F.R.S.	1	1	0
Pagden, Stephen	0	10	6
Pakington, Sir John S., Bart., M.P.	1	1	0
Palmer, George	1	1	0
Paul, J. Michell	1	1	0
Pearce, Alfred B.	1	1	0
Peckover, Jonathan	1	1	0
Penn, John	1	1	0
Petrie, Samuel	1	1	0
Pierce, William	1	1	0
Phelps, Charles	1	1	0
Phillips, Sir Thomas, F.G.S.	1	1	0
Pitts, Samuel	1	1	0
Platt, John	1	1	0
Potter, Thomas	1	1	0
Preller, C. A.	1	1	0
Price, Arthur J.	1	1	0
Proctor, John	1	1	0
Provis, William Alexander	1	1	0
Pryor, William S.	1	1	0
Quain, Richard, M.D.	1	1	0
Radstock, Lord	1	1	0
Ratcliff, Charles	1	1	0
Rawlinson, Robert	1	1	0
Rawson, W. H. Jun.	1	1	0
Redgrave, Samuel	1	1	0
Reeve, Charles	1	1	0
Reeves, John Russell, F.R.S.	1	1	0
Reid, Lestock Robert	1	1	0
Reiss, James	1	1	0
Rennie, Sir John, F.R.S.	1	1	0
Reveley, Henry W	0	10	0
Rivett, Joseph Cedric	1	1	0
Rixon, Alfred H.	1	1	0
Robb, Alexander	1	1	0
Roberts, Henry, F.S.A.	1	0	0
Rodocanachi, M. E.	1	1	0
Routledge, Thomas	1	1	0
Russell, Capt. G.	0	10	0
Russell, John	1	1	0
Russell, John James	1	1	0
Russell, John Scott, F.R.S.	1	1	0
St. David's, Bishop of	1	1	0
Salisbury, the Marquis of, K.G.	1	1	0
Salomons, Aaron	1	1	0
Salomons, David	1	1	0
Salt, Titus	1	1	0
Sargood, F. J.	1	1	0
Saul, G. T.	1	1	0
Schneider, Richard	1	1	0
Sedgwick, John Bell	1	1	0
Shearer, Bettesworth Pitt	1	1	0
Sheriff, G. W	1	1	0
Shove, W. Spencer	1	1	0
Sibthorp, Henry, A. M. W.	1	1	0
Sich, Henry	1	1	0
Silverlock, H.	1	1	0
Simon, George	1	1	0
Simpson, William Butler	1	1	0
Skey, Joseph, M.D.	1	1	0
Smart, Sir George T.	1	1	0

Smith, George	1	1	0
Smith, George	1	1	0
Smith, J. Scott	1	1	0
Smith, R. M.	1	1	0
Smith, T. Mosdell	1	1	0
Sopwith, Thomas, F.R.S.	1	1	0
Spark, Henry King	1	1	0
Spicer, Henry	1	1	0
Spicer, William Revel	1	1	0
Stanton, George	1	1	0
Stephens, Charles	1	1	0
Stephens, Henry	1	1	0
Stephenson, James	1	1	0
Stirling, Thomas	1	1	0
Stohwasser, Joseph	0	10	6
Straker, John	1	1	0
Styles, Thomas	1	1	0
Sugden, Samuel	1	1	0
Sulivan, Right Hon. Lawrence	1	1	0
Symonds, Capt. R.N.	1	1	0
Sykes, Col. W. H., M.P., F.R.S.	1	1	0
Taylor, George	1	1	0
Taylor, John	1	1	0
Tennant, James	1	1	0
Teulon, Seymour	1	1	0
Thomas, John Evan, F.S.A.	1	1	0
Tomkins, Edward	0	10	6
Tooke, William, F.R.S. (President of the Society)	1	1	0
Trevelyan, Arthur	1	1	0
Trevelyan, Sir Walter Calverley, Bart.	1	1	0
Trower, G. S.	1	1	0
Tuely, Nathaniel C.	1	1	0
Tueski, Moritz Paul	1	1	0
Tulloch, James	1	1	0
Turner, Benjamin Brecknell	1	1	0
Turner, W. Shearman	1	1	0
Twining, Thomas	1	1	0
Underdown, E. M.	1	1	0
Unwin, George	0	10	0
Vandoni, Le Commandeur Comte de	1	1	0
Vane, Rev. John	1	1	0
Varley, Cornelius	0	10	6
Veitch, James	1	1	0
Vieweg, A. J.	1	1	0
Walker, Sir Edward S.	1	1	0
Wardell, William	1	1	0
Wass, C. Wentworth	0	10	6
Watkins, Zachariah	1	1	0
Watney, Norman	1	1	0
Watson, Dr. J. Forbes, M.A.	1	1	0
Watson, Joseph Yelloley	1	1	0
Watson, Thomas, M.D.	1	1	0
Webb, Charles Locock	1	1	0
Webb, Henry Bellamy	1	1	0
Webb, John	1	1	0
Webber, Henry	1	1	0
Whetham, Charles	1	1	0
White, H. C.	1	1	0
Whitfeld, Henry	1	0	0
Willich, C. M.	1	1	0
Williams, Charles Wye	1	1	0
Williams, R.	1	1	0
Williams, Walter	1	1	0
Williams, William	1	1	0
Wilson, G. Fergusson, F.R.S.	1	1	0
Wilson, W. Newton	1	1	0
Winkworth, Thomas	1	1	0
Woodd, Basil Thomas, M.P.	1	1	0
Wood, John	1	1	0
Wood, John	1	1	0
Wood, Vice-Chancellor Sir W. Page	1	1	0
Woodhouse, John Thomas	1	1	0

Woollams, Henry	1 1 0
Woolloton, Charles	1 1 0
Worms, George	1 1 0
Wright, Philip	1 1 0
Wyon, Joseph Shepherd	1 1 0
Wyon, Leonard C.	1 1 0
Yeats, John, LL.D., F.R.G.S.	1 1 0
Zaehnsdorf, Joseph	0 10 6
Zetland the Earl of	1 1 0

SIXTEENTH ORDINARY MEETING.

Wednesday, March 25, 1863.

The Sixteenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 25th inst., Thomas King Chambers, Esq., M.D., in the chair.

The following candidates were proposed for election as members of the Society:—

Allan, William	12, Marquess-villas, Canonbury, N.
Appleby, Samuel	6, Harper-street, Red Lion-square, W.C.
Battye, Richard F., M.D.	6, Gloucester-street, Belgrave-road, S.W.
Belany, Archibald	37, Clarendon-road, Kensington-park, W.
Bennet, James Lindsay	2, Taviton-street, Gordon-square, W.C.
Catto, John	30, Milner-square, Islington, N., and 50, Upper Thames-street, E.C.
Lloyd, George Alfred	30, John-street, Bedford-row, W.C.
Muirhead, J.	Electric Telegraph Company, Gloucester-road North, Regent's park, N.W.
Parsons, John Meeson	6, Raymond-buildgs., Gray's-inn, W.C.
Puller, Arthur Giles	Athenæum Club, S.W., and 14, Portland-place, W.
Rhodes, Henry	86, Cambridge-street, Pimlico, S.W.

The following Candidates were balloted for and duly elected members of the Society:—

Alcock, Thomas, M.P.	Union Club, S.W., and Kingswood Warren, Epsom.
Angel, Moses	1, King-street, Finsbury-square, E.C.
Ashton, John	10, Upper Barnsbury-st., N.
Aste, John	32, Oakley square, N.W.
Barbier, E.	9, St. Leonard's-terrace, Maida-hill, W.
Barker, George	14, Portman-square, W.
Barnard, George F.	4, Essex-court, Temple, E.C., and Cross-deep, Twickenham, S.W.
Barrass, Samuel	29, Upper Park-street, Barnsbury, N.
Barron, Frederick	8, St. Agnes-villas, Bayswater-road, W.
Bayford, Augustus F., LL.D.	52, Upper Bedford-place, W.C.
Clayton, Capt. John Wm., F.R.G.S.	14, Portman-square, W.
Hartley, T. H.	Earl-street, Horseferry-road, Westminster, S.W.
King, Charles Beeden, M.E.	20, Abingdon-street, Westminster, S.W.
Mussali, Colonel Elias	Sous Directeur au Ministère des Affaires Etrangères de S. A. le Bey de Tunis.

The Paper read was—

ON THE SUPPLY OF QUININE, AND THE CULTIVATION OF CHINCHONA PLANTS IN INDIA.

By Clements R. Markham, F.S.A.

The supply of quinine and of other alkaloids derived from chinchona bark, is a subject which is well worthy of the attention of a Society such as that which has honoured me with its attention this evening; and small as my scientific attainments are, yet the active practical part I have taken in the introduction of chinchona cultivation into India, will, I trust, insure to me a favourable hearing.

That there should be a certain and largely increased supply of quinine, more especially for all tropical countries, is a point of paramount importance to the interests, not of this country alone, but of the whole civilised world. When we consider the thousands of people who have prematurely died from want of this unfailing remedy, and the thousands whose lives are now saved by its timely use, we can entertain no doubt as to the greatness and the extent of the calamity which a failure in the supply would bring with it. As a midshipman it was frequently my duty to take a boat's crew up the forest-bordered rivers of the west coast of Mexico, and I well remember the feeling of confidence which we derived from the doses of quinine administered before starting, when we saw the heavy fever-bearing mists gathering and lowering over the muddy banks. Such precautions have saved the lives of many officers and men engaged in boat service on all the tropical stations. To the use of quinine Dr. Baikie ascribes the escape of his party from the dangers of the pestiferous Niger, and in India it may be looked upon almost as a necessary of life. But, in a commercial as well as in a philanthropic point of view, the extension of the use of quinine to whole classes of people to whom it is now unattainable will be as important a result of the cultivation of chinchona plants, as the security of a constant supply to those who have hitherto enjoyed its beneficial effects.

In discussing the sources of quinine supply I propose first to cast a glance over the South American forests which now yield all the barks of commerce, and then to enter more fully on the prospects of chinchona cultivation in India and Ceylon. It will be seen, from what I shall have to say on the former portion of the subject, that the danger of the supplies of bark being checked is certainly neither remote nor imaginary.

Up to the present time the most remarkable feature in the bark trade is that no attempt worth mentioning has ever been made in South America, either to cultivate the chinchona, or to enforce any system of conservancy. On the temperate and sub-tropical slopes of the cordilleras of the Andes, the genus *Chinchona* flourishes, and in no other part of the world. These healing plants are entirely confined by nature to one particular region, and it is to the certainty of possessing a close monopoly that the utter recklessness of the South Americans in their treatment of chinchona trees may be referred. The chinchona region, following the line of the cordillera of the Andes for a distance of 1,740 miles of latitude on both sides of the equator, embraces portions of four of the South American republics, namely, New Granada, Ecuador, Peru, and Bolivia; and the inhabitants of these countries have rivalled each other in their short-sighted and reckless destruction of the chinchona trees with a view to immediate profit.

It must be borne in mind, however, that this extravagant felling of trees is not confined to the South Americans, of whom I am desirous of speaking with respect, for a long acquaintance with them has convinced

me that the contemptuous tone in which they are usually spoken of here is undeserved, and that they possess many good qualities. A race which has produced a botanist such as Triana, an antiquary such as Rivero, a jurist such as Bello, a divine such as Vigil, in a single generation, and in the first generation of its separate existence, is not to be despised. If the South Americans have been regardless of the most rudimentary laws of forestry, so have the English in India until very lately. The improvident destruction of teak, black wood, and other valuable timber in the forests of India has been quite equal to the devastation in the chinchona region, and it is only within the last five years that any system of forest conservancy has been established in India at all. Englishmen, therefore, have no right to cast the first stone at South American improvidence. Having thus entered a protest in favour of my friends, I may now, with a clear conscience, proceed to touch upon their misdeeds in the chinchona forests.

Commencing our review in the northern part of the bark country, we find that wild work has been going on in New Granada for many years. Up to the year 1855 the destruction of chinchona trees of the valuable kinds called *Pitayensis* and *Lancifolia* was rapid and indiscriminate; and in that year the supplies began to fail. More recently the civil war between the ambitious Mosquera and his accomplished cousin, Arboleda, has put a stop to trade, and thus given a respite to the trees, so that small quantities of bark are again beginning to arrive from Carthagena. A period of peace and commercial activity will soon exhaust the supplies again; and, unless some system of conservancy is introduced, there will be long periods during which the supplies will entirely fail. Captain Doyle, Her Majesty's Consul at Carthagena, has promised to send me an account of the quantity of bark exported in recent years from New Granada, but I have not yet received it.

We next come to Ecuador and its once invaluable forests on the western slopes of Chimborazo and on the mountains of Loxa. Here the recklessness of the bark collectors has resulted in actual extirpation. The forests of Loxa produced the parent of all the Chinchonæ, to which Dr. Hooker has now very properly restored the original name given by Linnæus, *Chinchona officinalis*. A hundred years ago Condamine and Ulloa warned the bark collectors that they were killing the goose with the golden egg. Humboldt tells us that in his time 25,000 trees were destroyed every year, and the destruction went steadily on, until the variety first discovered by Condamine, and sent by him to Linnæus, has almost entirely disappeared. Here the destruction was more effectual than elsewhere, because the trees were not felled, but left standing deprived of their bark, in which case they are attacked by rot with extraordinary rapidity in tropical forests, hosts of insects penetrate to the stem, and the healthy roots become infected. Another variety of *Chinchona officinalis*, the bark of which still finds its way to England in the form of very small quills, is also threatened with extermination. As a large tree it has ceased to exist, and the young plants are pulled up by the roots when their bark is wanted, while the annual burning of the slopes, and the continual cropping of the young shoots by cattle assist the work of destruction. The forests of *Chinchona succirubra* or "red bark," on the western slopes of Chimborazo, have also been nearly worked out. All the large trees of this, the most valuable of the quinine-yielding species, are fast disappearing; and Mr. Spruce, who has recently been employed in that district, is of opinion that little or no red bark will be exported during the present year. In 1861 the quantity and value of bark exported from Guayaguil and Payta were as follows:—

	lbs.		£
Red bark and "West Coast Carthagena" from Guayaguil	443,700	worth	17,748
Crown bark from Payta	140,000	,,	8,400
Total from the forests of Ecuador	583,700	,,	26,148

Peru, the very country which gave her name to the febrifuge chinchona bark, has now altogether ceased to supply any. So far as I have been able to ascertain, scarcely any of the grey barks of commerce from the Peruvian forests of Huanuco and Huamalies now find their way into the European markets, and all the trees of the precious *Chinchona Calisaya* of any size in Southern Peru have, by dint of remorseless felling, been entirely destroyed. I have myself struggled for days and days through the dense forests of Caravaya in search of them, and scarcely ever met one that had attained a higher altitude than my own head. Fifteen or twenty years of merciless hewing and barking have completed the ruthless work, and the beautiful crests of bright foliage and fragrant flowers, which once overtopped all the trees of the forest, have long since disappeared. It is true that bark is shipped from the Peruvian ports of Payta, Arica, and Islay, but none of it has grown in Peruvian forests.

Bolivia, whence the supplies of bark from the *Chinchona Calisaya* are derived, is also rapidly working out this source of wealth, while her legislators have their eyes wide open to the danger, and from time to time make futile attempts to avert it by restrictive laws. The calisaya species is the most highly esteemed in commerce, and, next to the "red bark," contains the largest per-centage of febrifuge alkaloids. The price is proportionally high, and the consequent eagerness of speculators to embark in this trade has been followed by a wide-spread extirpation of chinchona trees. On more than one occasion, the Bolivian government have prohibited the cutting of bark for a term of years, in order to give the forests a respite, and to bring up the price in European markets, but the decrees were never rigorously enforced, and were abrogated long before the specified periods had elapsed. Dr. Weddell informs us that, at the centre of what was formerly the chief bark collecting district, the surrounding forests are now quite cleared of chinchona trees, and that it is necessary to seek them at a distance of ten or twelve days' journey from any inhabited place. In another part of his work, the same eminent authority says:—"The forests of Bolivia, rich as they are, cannot long resist the continued attacks to which they have recently been exposed. He who, in Europe, sees these enormous and ever increasing masses of bark arrive, may, perhaps, believe that they will continue to do so; but he who sees the chinchona trees in their native forests, and knows the real truth, is obliged to think otherwise." In 1860, the quantity and value of calisaya bark exported from Islay and Arica were as follow:—

	lbs.		£
From Islay................	107,700	valued at	9,770
Arica................	388,800	,,	35,000
Total from Bolivia	496,500	,,	44,770
Total from Ecuador	583,700	,,	26,148
	1,080,200	,,	70,918

These facts sufficiently demonstrate the precarious nature of the present supplies of bark from South America.

Of course, it will be readily understood that the danger does not consist in the actual extirpation of the chinchona genus, for this it would be beyond the power of the most industrious *cascarilleros* to effect. Numerous shoots will always continue to spring up from the old stools. But the indiscriminate destruction of all trees above the size of mere saplings will most assuredly result in the complete stoppage of the supplies of bark during several years, and at frequent intervals; while quinine will continue to be a costly luxury, and quite beyond the reach of thousands whose lives are now sacrificed from inability to procure it.

I am unable to hold out a hope that this evil can be remedied by any means that are likely to be adopted in South America itself. If the cultivation of chinchona trees were undertaken on a large scale in their own mountains; if extensive nurseries of young plants were established in the native forests of the several valuable species, and a

well matured system of forest conservancy were strictly enforced, the supplies of bark from South America would be abundant and inexhaustible. But this will never be done. As a general rule the native speculators look only to immediate profit, and even if European capital and enterprise should ever be turned in this direction, the impossibility of procuring adequate supplies of labour will present an insurmountable difficulty for many years to come.

It will, therefore, be seen that the danger of a failure in the supplies of bark from South America is imminent, while the disastrous consequences of such a failure must be patent to everyone. In India alone, an entire stoppage of quinine would be attended by the most fatal consequences, and it is not too much to say that such a calamity would be to the European what the famine of 1860-61 was to the native population.

Hence the incalculable importance of introducing the cultivation of all the valuable species of chinchona plants into India. Such a measure, if successful, would not only ensure a sufficient and unfailing supply of quinine for the use of Europeans, it would also bring this inestimable drug within the reach of the native population, and offer another promising opening for commercial speculation. When these considerations were placed before Lord Stanley, in 1859, he at once saw the importance of the measure, and it was under his auspices that it was undertaken. The management of the enterprise was entrusted to me, and, no other better qualified person having come forward, I undertook the superintendence of the collection of chinchona plants, and seeds of all the valuable species in South America, and of their introduction into India.

Before entering upon the more important portion of this paper, connected with the cultivation of the plants in India, it will be well to say a few words respecting the hard and difficult work of collecting in South America.

I resolved at once that all the valuable kinds should be introduced; that none should be collected which were not of well-established commercial value; and that the work should be completed in as short a time as possible. The two years that followed were to me a period of intense anxiety. The difficulties were immense, and at times I feared that they would be insuperable. This was not an enterprise such as the introduction of tea or coffee, or American varieties of cotton. It must be remembered that the chinchona had never been cultivated; that it grows in forests scarcely ever visited by any European; that these forests are approached by paths which skirt the edges of perpendicular precipices, pass over the region of perpetual snow, and through bleak wildernesses devoid of all resources; that the forests are for the most part so dense and closely matted, that every foot of the way must be actually hewn out, uninhabited, and fever-haunted; that the chinchona plants are so scarce, and in many instances so inconspicuous, owing to all the large trees having been felled, that it is like seeking for a needle in a bundle of hay, and that the South Americans were certain to put every possible obstacle in the way of the exportation of the plants and seeds. It was no easy matter, either, to find agents possessed of the necessary qualifications, but in this respect I was peculiarly fortunate in securing the services of such men as Mr. Spruce and Mr. Pritchett, and of the gardeners Cross and Weir. It is impossible to speak too highly of the zeal and devotion of these intrepid explorers—zeal which I may almost call disinterested, for the remuneration offered them was certainly small when compared with the vast importance of the service they performed. Mr. Spruce, too, brought to the work no ordinary acquirements as a botanist and accurate observer, and I have no hesitation in saying, that his report on the region of the "red bark" is the most valuable account of a chinchona forest that has ever appeared in Europe. It is unnecessary to dwell longer on this part of the subject. We all had to go through dangers and hardships of no ordinary character, and it must be well known that no man can wander for many days on foot in those tropical forests with impunity, and without permanent injury to his constitution. On Mr. Spruce I am sorry to say, whose zeal in the cause of science has won him a name among botanists, the hand of disease has since pressed very heavily. Cross, a young, vigorous, and resolute man, is still in South America, on his way, I hope, to procure a supply of seeds of the valuable species of chinchona in New Granada.

I shall be excused, I trust, for making this short digression, in order to record the labours of my coadjutors. By March, 1862, the battle was fought and the victory won. In that month the last plant arrived, and all the valuable species were safely established in the Neilgherry Hills in Southern India. In addition to the plants and seeds from the forests of South America, we also received six plants of *C. Calisaya* from Sir William Hooker, who has throughout taken a deep interest in the success of the enterprise, and rendered most important assistance; a valuable plant of *C. officinalis, var. Condaminea*, from Mr. Howard; and some plants of *C. Calisaya*, and one of *C. lancifolia*, from the Dutch plantations in Java, in exchange for plants of the red and grey bark species. The following are the kinds now growing in the Neilgherry hills, and they embrace all that are considered valuable in commerce:—

1. *C. succirubra* (red bark), from Ecuador.
2. *C. Calisaya* (yellow bark), from Caravaya and Bolivia.
3. *C. officinalis*, *var. Condaminea* . } (crown bark) from Ecuador.
   var. Bonplandiana }
   var. crispa .... }
4. *C. nitida* .... }
5. *C. micrantha* ...... } (grey bark) from Northern Peru.
6. *C. Peruviana* ...... }
7. *Species without name* }
8. *C. lancifolia* (Carthagena bark), from New Granada.

The success of the experiment, after the arrival of the plants in India, is entirely due to Mr. McIvor, now superintendent of chinchona plantations in the Madras Presidency, whose energy, ability, high qualifications as a gardener, and extraordinary skill as a propagator, have been the means of establishing the cultivation of these precious trees on a footing which has now placed it beyond the reach of failure. The most important point, after the plants were safely introduced, was the selection of sites for their cultivation, which should be as nearly as possible equivalent in soil and temperature to their native forests, and in the performance of this duty I had the advantage of Mr. McIvor's advice and assistance.

It was necessary in the first instance to select two sites, at different elevations, one for the chinchonæ which inhabit very lofty situations, such as the species of the Loxa, and one of those of the Huanuco forests; and another for the "red bark" trees and the *Calisaya* species. We fixed upon a wooded ravine, well watered and with a soil consisting of rich deep loam, as the site for the loftier plantation, where the temperature exactly tallies with that of the Loxa region. It is now called the Dodabetta plantation, and is 7,600 feet above the level of the sea. The selection of the other site was a more important business, as it was to be the nucleus of the more extensive and valuable plantations. After much careful examination of various localities, we at last fixed upon a tract of forest land called Neddiwuttum, at the north-western angle of the Neilgherry hills, overlooking the table land of Wynaad. The rock on this part of the plateau is a hornblendic gneiss, the heights are well watered and wooded, and the temperature corresponds with those of the red bark forests and of the forests of Caravaya. The elevation above the sea is from 6,000 down to about 4,800 feet. The only fear I felt when these sites were selected was that the amount of moisture might prove to be insufficient for the requirements of the chinchona plants, bu the way in which they have weathered two dry seasons has quite dispelled all anxiety on that score.

During the first year after the introduction of the plants into India, that is from January, 1861, to January, 1862,

the operations were chiefly confined to propagating under glass. The details connected with this delicate operation, requiring so much intelligent care, are exceedingly interesting, and reflect the greatest credit on Mr. McIvor, whose unprecedented success has brought the experiment forward more rapidly than could possibly have been anticipated. His method of treatment of young seedlings and cuttings, with full and minute details respecting the proper soil, temperature, and moisture, and his way of raising plants from layers and buds, will be found in the second number of the *Journal of Botany*, edited by Dr. Seemann, which contains Mr. McIvor's able report, dated July, 1862, and several other documents on the same subject. This number should be in the hands of every one who intends to undertake chinchona cultivation, or who feels an interest in the success of the undertaking; but my time warns me that I cannot dwell longer on this very important though preliminary portion of my story.

The results of Mr. McIvor's work have been that, whereas in January, 1862, there were 8,613 chinchona plants on the Neilgherry Hills, in January, 1863, there were 127,671 plants, exclusive of many hundreds which have been forwarded from this great central depôt to various other parts of India. I append a table (see next page), showing the monthly increase in the number of plants from June, 1861, to January, 1863.

I understand that doubts have been suggested, in certain quarters, as to the accuracy of Mr. McIvor's monthly reports on the growth and number of the plants, and that it has been hinted that both are somewhat exaggerated. With regard to the height of the plants, Sir William Denison has measured them with his own hands, and thus certified to Mr. McIvor's correctness; and as to their number, there can be no mistake, because an official list is kept, not only showing the general result, but the number in each man's charge. At the end of every month the gardeners have to send in a return of the number they have received, the number that have died, and the number that have been issued to other parties. This system was introduced not only to preserve a correct account of the number of plants, but also to enable the superintendent to judge of the relative skill of his subordinates. These facts will probably set any doubts which may exist on this point at rest.

In the spring of 1861, Mr. McIvor commenced his first experiments in planting out in the open air, and the plants thus exposed bore the cold and drought of the following dry season without any injury. Thus encouraged, the formation of a nursery at Neddiwuttum was begun in January, 1862, large enough for 300,000 plants, and 2,400 were planted out. From that time the work of planting out has progressed steadily at both the sites. Last autumn the Dodabetta site, extending over 85 acres, was in a forward state; 45 acres were in various stages of preparation, and 15 were actually planted. Here the hardy species from the forests round Loxa, the *Chinchona officinalis* of Linnæus, is thoroughly established in its new home, and is not in the least affected by the cold and drought of the winter. At Neddiwuttum the operations are more extensive, and are thus described by Sir William Denison:—" At the top of the hill—a height of about 6,000 feet above the sea—a number of plants have been in the ground for upwards of a year. They had been exposed to the cold of the winter, the drought of the spring, and the wet of the monsoon, yet nothing could look more healthy than the whole of them. Further down the hill a piece of ground, about 68 acres in extent, had been cleared and prepared for plants; this site occupied two sides of a valley, and was sheltered by belts of trees on the ridges, separating it from adjacent valleys. About 18 acres of this were planted, and the plants looked healthy and flourishing. In another valley, at a lower level, about 180 acres had been felled and partially burnt, and below this again was the propagating house and the nursery for young plants."

At present there are 35,000 plants permanently planted out at Neddiwuttum, and when it is considered that the average growth during last January was 3½, and the maximum, 6 inches; it will be seen how little effect the dry and cold season has upon them, the only point respecting which I ever had any apprehension. There are to be four chinchona plantations at Neddiwuttum and Pycarrah, besides the Dodabetta site.

	Acres.
At Neddiwuttum, the two Denison plantations...	210
,, the Markham plantation	200
Near Pycarrah, the Wood plantation	250
At Dodabetta, the plantation............	85
	745

and it is the intention of government to plant 150 acres annually for at least ten years, so that at the end of that time there may be a prospect of obtaining a very large harvest of quinine-yielding bark.

We now come to the great question, upon the right decision of which all success depends, namely, the method of cultivation which will ensure the largest supplies of bark in the shortest time, and the largest per-centage of alkaloids in the bark.

I must again repeat the important consideration that the chinchona was not a previously cultivated plant, respecting which all requisite information could easily be obtained—like tea, coffee, the American varieties of cotton, and other valuable products which have from time to time been introduced into India. The chinchona plants were collected in the dense unfrequented forests of the cordilleras, and the cultivator in India had everything to learn by experience and careful experiment, for unfortunately from Java, where the chinchona has been introduced for some years, there was nothing to learn and everything to avoid. Mr. Spruce, in his report, makes the following important remark:—" I have seen enough of collecting the products of the forests to convince me, that whatever vegetable substance is needful to man, he must ultimately cultivate the plant producing it;" and in doing so he must not, like the Dutch in Java, imitate the surrounding circumstances of its wild condition, by placing it in a forest under dense shade; this is not cultivation. In the forests the chinchona, like everything else, suffers more or less from overcrowding and exclusion from light and air, for in those great laboratories of nature there is a continuous struggle for life, and the weakest goes to the wall. Under cultivation these adverse influences should not be repeated but removed, and the plants should be surrounded by every artificial advantage that science or experience can suggest. Of one thing, therefore, there could be no doubt, that the chinchona plants must have plenty of light, air, and room wherein to develop their proportions, though shaded from the direct rays of the sun while young and tender.

Mr. McIvor, while strongly impressed with the absurdity of growing the plants under dense shade, saw at once that while young, they must be protected from the effects of excessive evaporation during the dry season under a bright and scorching sun, and also from the injury likely to be done by excessive radiation during cloudless nights. On the approach of the dry weather, he therefore sheltered them by rough enclosures of bamboo branches, with the leaves adhering to them, so as to give them sufficient shelter both from the effects of evaporation and radiation. The soil round the roots of the young chinchonas was also covered with one or two inches of half-decayed leaves, and, thus treated, these plants are as luxuriant as any in the propagating houses.

The next point to be decided was the way in which the harvests of bark were to be secured; whether the chinchonas should be raised as large shrubs in open ground, or as tall trees under the shade of the forest. The former alternative has been decided upon. The idea of waiting for forty years, until the chinchonæ had attained their full growth, before any bark could be obtained, and then destroying the trees, and having to wait another forty years for a second harvest, only requires to be stated, and it at once

MONTHLY REPORTS OF THE NUMBER AND GROWTH OF THE CHINCHONA PLANTS ON THE NEILGHERRY HILLS.

DATE.	Chinchona Succirubra.							C. Calisaya.	C. Micrantha.	C. Nitida.	C. Peruviana.	Grey Bark Species, without name.	Growth of the Seedlings of the "Grey Bark" Species.				Chinchona Officinalis.			C. Lanceolia.	C. Pahudiana.	Total Number of Plants.
	Number of Plants.	Average Monthly Growth.	Size of Leaves.	Maximum Monthly Growth.	Height of Tallest Plant.	Circumference of the Stems of largest Plants, near the ground.	Extreme Width through the Branches.						Average Growth.	Maximum Growth.	Size of Leaves.	Height and Breadth.	Variety *Condaminea*.	Variety *Bonplandiana*.	Variety *Crispa*.			
		in.	inches.	in.	ft. in.	inches.		No.	No.	No.	No.	No.	in.	in.	inches.	inches.						
1861.																						
June	967	...	...	...	...	...	...	6	511	430	28	172	...	...	...	3 high.	...	...	...	...	...	2,114
July	1,204	$1\frac{1}{2}$	11×7	...	2 6	...	...	6	802	714	36	211	$1\frac{1}{4}$	...	$2\frac{1}{2}\times1\frac{1}{4}$	$4\frac{1}{4}$ "	...	...	...	...	...	2,973
August	1,517	$1\frac{3}{4}$	$11\frac{1}{8}\times7\frac{1}{8}$	7	2 10	...	...	6	896	804	42	271	$1\frac{1}{2}$	$2\frac{1}{2}$	...	$8\frac{1}{2}$ by 7	...	...	...	...	...	3,536
September ...	2,361	3	$14\frac{3}{4}\times10$	8	3 2	...	...	6	905	840	42	298	2	$3\frac{1}{4}$	...	13 by 10	...	...	...	...	...	4,452
October	3,137	$2\frac{1}{2}$	15×10	11	3 6	...	...	6	905	854	58	298	$1\frac{1}{2}$	$3\frac{1}{4}$	...	15 by 12	...	...	...	...	21	5,315
November ...	3,477	$2\frac{1}{2}$	$16\frac{1}{2}\times10$	11	3 9	...	...	6	963	917	58	314	$1\frac{1}{2}$	$3\frac{1}{4}$	...	16 by 14	...	...	...	...	112	5,847
December ...	4,762	$2\frac{1}{2}$	18×12	9	3 9	...	...	6	1,228	917	64	314	$1\frac{1}{2}$	$3\frac{1}{4}$	...	16 by 15	...	...	...	...	175	7,466
1862.																						
January	5,200	...	18×12	...	4 0	$3\frac{1}{2}$	...	59	1,497	1,050	64	314	...	...	...	...	...	...	...	4	425	8,613
February	6,580	...	18×12	...	4 6	$3\frac{1}{2}$	...	67	1,713	1,000	60	308	...	...	...	...	...	...	...	4	425	10,157
August	30,150	...	...	...	...	...	...	1,050	7,400	8,500	2,295	2,440	...	...	...	...	41	20,030	236	1	425	72,568
December ...	45,352	4	...	...	7 0	$5\frac{3}{4}$	3 to 5 ft.	1,448	8,304	8,591	2,729	2,569	...	...	...	...	872	46,751	664	1	425	117,706
1863.																						
January	47,507	4	...	6	7 3	...	...	1,424	8,247	8,296	2,772	2,579	...	...	...	...	891	54,790	739	1	425	127,671

The increase would have been greater had not many plants been sent to other parts of India. In December, 1861, Chinchona plants were sent from the Neilgherry hills to form a nursery at Darjeeling—87 of *C. succirubra*, and 106 of the grey bark species, besides 16 sent to Travancore. In January, 1863, 350 more plants were sent to Darjeeling, 150 to Dr. Jameson, in the North-West Provinces, and 500 to the Rajah of Travancore.

condemns itself, while to secure a continuous supply under such circumstances would require an area of chinchona forests which even India could not supply.

Under cultivation, therefore, the chinchonæ must be treated as shrubs yielding a yearly harvest of quill bark from their branches, by simply lopping and pruning. The plants will be benefited rather than injured by the yearly removal, before the middle of the dry season, of a certain portion of their branches. Mr. McIvor anticipates that from the sixth to the eighth year after planting, the produce will thus consist entirely of quill bark, but that after the twelfth year of the growth of the plants a large proportion will be *plancha* or flat bark. There is no danger of the plants not throwing out a sufficient number of branches, for already those only fifteen months old have eleven to thirteen, some of them 3½ feet long. The shrubby varieties will be grown at a distance of 7 or 8 feet apart, which will give about 700 plants to the acre. The layer-grown species will be 9 to 10 feet apart, giving 500 to the acre. This will eventually be too close, but when they begin to impede each other's growth, they can be thinned out, and the operation will furnish a large supply of bark in about the twelfth year.

With regard to the quantity of quinine and other febrifuge alkaloids in quill bark, I find that the maximum yield from most of the species in a wild state is 3 per cent., and of the "red bark" kind, which predominates on the Neilgherry hills, 5 per cent. From cultivated plants, when every advantage that science or practical experience can suggest is furnished to them, a much larger yield may be expected. In gathering the bark, great care is requisite to dry it thoroughly before it is packed in bales. In the South American forests the *cascarilleros* perform this operation by means of fire. They build a hut, and at a distance of about eight feet from the ground cross-beams are stretched across under the roof, on which a lattice-work of bamboos is placed. The bark is then spread out on this grating, and fires are lighted on the ground. The thin bark from the branches soon curls up into quills, and the thick *plancha* bark is turned from time to time for about three weeks. These operations will be conducted far more easily, and with more method, on our plantations; and it will probably be found advisable to manufacture quinine *in situ* at some future day. Before we leave this portion of the subject, it will be well to quote a letter from Dr. Anderson, who is in charge of the chinchona nursery at Darjeeling, by which it appears that the leaves as well as the bark possess febrifuge virtues. He says, "When the leaves of *Chinchona succirubra* fell off spontaneously in June and July, I succeeded in forming an infusion from them, which I sent to Dr. Collins, civil surgeon of Darjeeling, with a request that he would administer it to some of the patients in the hospital. He informed me that he had given the infusion, in doses of one fluid ounce, to the first four cases of intermittent fever that occurred, and that these patients had been cured without any other medicine whatever. This result proves that the infusion of the leaves of *Chinchona succirubra* possesses some of the febrifuge properties of the bark; the infusion is of a dark chocolate colour, and is intensely bitter." Dr. Anderson thinks that the healing principle in the leaves is probably kinovic acid. If this discovery should really turn out to be of importance, it will greatly increase the value of the plants, because they would begin to yield a small return in the first year or two, and long before the bark is available.

A supply both of bark and leaves from Chinchona trees grown in the Neilgherry hills is now on its way to England, and I regret very much that they did not arrive in time for me to give the results of the analysis on this occasion. I received a specimen of very young bark nearly a year ago, which was kindly analysed for me by Mr. Howard, both chemically and microscopically, and so far as so small a piece would enable him to do so, he obtained a satisfactory result. The test of sublimation showed abundance of the distinctive carmine colour indicating alkaloid, and the section under the microscope showed the commencement of the chief tissues, the suberous being well developed, as is the case with the best quinine-yielding barks generally. There is another hopeful fact in connection with this small piece of bark. It was taken off a young shoot, which was immediately wrapped round with moss, and on removing the moss less than three months afterwards, the whole was again covered with new bark, quite even, and nearly as thick as that below, which had not been taken. This proves that the plants have the power of reproducing their bark, if covered and kept moist.

From the plantations on the Neilgherries plants have been sent to various parts of India; 3,000 have been established at Darjeeling, under the care of Dr. Anderson; the Rajah of Travancore has received 516; Dr. Jameson, who has done so much for the establishment of tea plantations in the Himalayas, has had 150; Mr. Cope has applied for some to be planted in the valley of Rangoa, in the Punjaub; several have been sent to Professor Lees for trial in Assam; and private speculators in Bengal have applied for plants. In Ceylon, also, under the able superintendence of Mr. Thwaites, the chinchona plantations are progressing favourably, and will soon be in a position to supply the coffee planters, who are eager to undertake the cultivation, with young trees.

The advantages which the important and beneficial measure of introducing chinchona cultivation are likely to confer upon India may be considered under three heads:—1st. In their bearings in relation to the State, by providing an abundant and certain supply of bark for the use of hospitals and troops, and effecting a saving of many thousands of pounds. 2nd. As a commercial speculation, and a means of adding to the resources of the country. And, 3rd, though not least, as a boon to the people, by bringing the remedy within the reach of frequenters of jungles, and of the native population generally.

The government, by working their own plantations, will eventually save at least £20,000 a year, while they will secure a large and unfailing source of quinine supply for their own servants, the importance of which it is impossible to exaggerate. Dr. Macpherson, of Calcutta, tells us that since quinine has been extensively used among the troops in India there has been a steady diminution of mortality; and whereas, in 1830 the average per-centage of deaths to cases of fever treated was 3·66, in 1856 it was only 1 per cent in a body of 18,000 men, scattered from Peshawur to Pegu. These facts speak for themselves. The lives of hundreds of our soldiers depend upon the success of this experiment, and, in this point of view alone, the introduction of chinchona cultivation into India must be looked upon as one of the most important measures that has been sanctioned during Sir Charles Wood's administration of Indian affairs. The present governor of Madras, Sir William Denison, who has all along taken a deep interest in the experiment, is fully impressed with its importance to the government. In September, 1862, he recorded a minute, in which he entered into some calculations connected with chinchona planting. He thinks that if the lopping and pruning produce the quantity anticipated, the return will be sufficient to repay the capital expended in about ten years, inclusive of interest. The number of trees which an acre will cover is about 650, and it is calculated that each tree will produce, after ten years' growth, 5 lb. weight of bark annually. The yield per acre will thus be 3,250 lb., and for 160 acres upwards of 200 tons. At sixpence per pound, which is a very low rate, this will give £7,800 per annum as the return upon 160 acres, the annual expense of management being £1,320. This calculation refers to the Neilgherry plantations alone, and does not include Darjeeling, nor does it allow anything for those which will soon be formed in the North-West Provinces, Assam, Coorg, and the Pulneys.

We next come to the consideration of chinchona cultivation in its commercial aspect, and as a good investment

for capital. Private enterprise will be supplied with plants from the Government nurseries on the Neilgherries; 20,000 are to be sold this year, at four annas (sixpence) a-piece, and next year a much larger quantity will be available. As many as 35,000 have already been ordered by companies and private planters, and there can be no doubt that, as soon as land can be had, the demand will be almost unlimited. When it is considered that it will not cost more than two annas (threepence) to produce a pound of red bark, which is now selling at from half-a-crown to eight shillings in the London market, there is every reason to think that men of business will not overlook so promising an investment, and that the great difference between the cost of production and the value of the produce will give chinchona cultivation a good name as a safe speculation, in combination with coffee, the former beginning at the upper limit of the latter in the same clearing.

With a view to this cultivation in the hill districts, especially in the Madras Presidency, a great demand for land is sure to arise, and I will, therefore, briefly state the existing rules under which waste lands may be obtained, according to Lord Canning's resolution of October 17th, 1861, as altered by Sir Charles Wood in his despatch of July 9th, 1862. Waste lands are to be granted in perpetuity under certain rules, as heritable and transferable property, subject to no enhancement of land revenue assessment, and the land-tax may either be redeemed by a payment in full when the grant is made, or paid at a fixed annual rate. On the Neilgherry hills the coffee lands pay a tax of one rupee, and in Wynaad of two rupees an acre, levied on the third year, when the coffee first comes into bearing. The limit of time after which no previous claim that may be brought forward on the land will be valid, does not yet appear to have been finally settled. Land is in all cases to be advertised, and sold by auction to the highest bidder, or, in the event of there being no competition, to the applicant at the upset price, the cost of survey being added in both cases; and the upset price is to be regulated according to the description of land, its situation, and supposed fertility. On the 30th of August, 1862, the Bengal Government promulgated rules for the sale of waste lands according to the tenor of Sir Charles Wood's despatch, and the local rules for the Neilgherries have also been published by the Madras authorities.

The waste lands in all the hill districts of India will thus become available for tea, coffee, and chinchona cultivation, excepting such tracts as are reserved for the sake of valuable timber or fire-wood by the conservators of forests. It is not of course intended that all forests shall be reserved; and the Bengal Government has ruled that these reservations shall only include land in which teak or saul trees abound, and not tracts in which merely isolated patches of such trees are found. It must be remembered that, independent of the value of the timber, it is essential that belts of wood should be conserved, particularly along the upper courses of streams, in order to ensure the usual supplies of water, and to retain a due amount of moisture in the atmosphere. It is, therefore, the interest of all planters that a certain quantity of forest land should be retained in the vicinity of their clearings. A register of reserves for forest land, and the growth of firewood, is to be kept in the collector's offices, open to inspection.

These rules for the sale of waste lands will be especially advantageous to planters, who are desirous of obtaining clear and undisputed titles. Objections have been raised to the rule by which all land must be sold by auction, but it is really the only way of obtaining a fair price for the Government. There is more reason in the complaint that the rule by which the purchaser is not permitted to take possession until the survey is completed, will cause much loss and delay just at the very time when a beginner can least afford it. But no reasonable official is likely to require more than a preliminary survey, before possession is granted, merely in sufficient detail to insure the ready identification of the boundaries of lots, and to ascertain their gross area.

By the rules for sales in the Neilgherries, open land is to be sold with a land tax of 1 rupee per acre, and forest of $2\frac{1}{2}$ rupees; and the land tax may be redeemed at 25 years' purchase. The land is to be put up without any upset price, but subject to the above assessment, in lots of 500 acres each. All lots are to be previously demarcated, and the applicant must deposit the cost of survey. There is a great deal of good land still available for chinchona cultivation in the Neilgherries, although the demand at present is very great, and numbers of persons are anxious to embark in so promising an undertaking. Sir Charles Wood has sent out orders that every legitimate encouragement is to be extended to individuals or companies who may undertake the cultivation of fever bark, and I am sure that they will receive prompt advice and assistance from Mr. McIvor. I have already stated that several companies and private planters have undertaken chinchona cultivation in the Neilgherries and Wynaad, such as the Madras Coffee Company, whose estates are near Manantoddy, in Northern Wynaad; the Western Neilgherry Tea, Coffee, and Chinchona Company, whose estates of Maryland and Strathern are conveniently near the great source of supply, the government plantation at Neddiwuttum; and the Plantation Company of W. Hindustan. Wide fields for further cultivation of quinine-yielding bark are open in the Pulney and Anamallay hills, Coorg, Nuggur, and other parts of India. A portion of the press in India is in the habit of maintaining that the European planters can do no appreciable good to the country, but only to themselves. Paradoxical as such a theory must appear when we consider the increase of trade, the opening-up of hitherto worthless districts, the rise in the price of labour, and the consequent improved condition of the working classes, which have been caused by tea and coffee cultivation, it is absolutely false if applied to the chinchona plants. There are, I believe, several gentlemen present at this meeting who have engaged in undertakings embracing the cultivation of quinine-yielding bark, and I would impress upon them that, independent of the prospect of commercial advantages to themselves, they are conferring a direct and positive benefit upon the people of India by the raising of every chinchona plant which is put into the ground. Even those planters who do not engage in chinchona cultivation on a large scale, ought to establish a few rows of plants in the most elevated parts of their clearings, and to encourage the cultivation among the natives, from motives of humanity, and in order that the coolies, when attacked by fever, may at least have the green bark within their reach. As a commercial speculation, I have not the least doubt that the cultivation of chinchona plants will be very remunerative, far more so than tea, which requires much skilled labour, at least in Southern India. I am sure that I am expressing the views of all well wishers of India when I heartily bid God-speed to all who contemplate the cultivation of quinine-yielding plants.

Lastly, we have to consider the introduction of chinchona plants as it will affect the native population, as I think the most important, and certainly the most durable, advantage that this great measure will confer upon India. It is well-known that fever now makes fearful havoc over wide districts, especially such as are near the foot of mountain ranges, and that at present the healing chinchona bark is entirely beyond the reach of the sufferers. Before long I trust that the inhabitants of these fever-haunted districts will have supplies of bark at their own doors, or at least within easy reach. The growth of these plants should be urged upon every village, and every cultivator throughout the hill districts of India, in small gardens, or even if it be only a single tree behind a ryot's hut. For the poorer classes it will be unnecessary to go to the expense and trouble of extracting the alkaloid, because the green fresh bark is itself very efficacious. We are assured of this by that eminent German

naturalist, Dr. Poeppig. He tells us that, when attacked with violent tertian ague in the Peruvian forests, he made use of the green bark direct from the chinchona tree; and that, although, in consequence of unavoidable exposure in the rainy season, and the very great exhaustion after eight months of wild forest life, the disease returned on three occasions, it was each time conquered by the green bark within a week. He adds that, "After the first dose of this fresh and unadulterated remedy, a sensation of general well-being is felt, and after recovery, on the first excursion, one approaches the healing trees with warm feelings of gratitude." The grateful feeling of this solitary wanderer in South America will soon, we trust, be shared by millions of our Eastern brethren, to whom the fever bark has hitherto been unknown. When once its healing virtues have been experienced, and its fame has spread abroad, there will no doubt be a general desire to grow the plants, and we may anticipate that, like the peepul and the neem, it will, with more propriety, be venerated as sacred. The great Rishi and physician Aghastya, whose soul now hovers over the hills of Courtallum, will perhaps be supposed to have taken up his abode in the fever-dispelling bark tree.

Some steps will be necessary, in order to make the healing virtues of Peruvian bark known to the people, and to give the first impetus to its cultivation among them; but when this is once done, the chinchona will soon be growing in all the hill districts. So far as my observation extended, I did not find that the natives of India were slow to adopt the cultivation of a new plant, and in Coorg especially, the fine race of mountaineers who inhabit that beautiful district almost to a man had small coffee gardens behind their houses, although coffee cultivation was only introduced about seven years ago. In the case of the fever bark trees, the inducement to have them growing close at hand will be much stronger; but I would urge upon the government the advisability of offering prizes for the best chinchona gardens formed by ryots in the different hill districts, in order to give the cultivation a good start. This system of agricultural prizes has been very successful in various parts of India. In Candeish prizes were formerly given for the best horses and cattle, and recently the government have given prizes for the best cleaned cotton. Sir George Clerke, when governor of Bombay, in 1847, gave a cart and horse as a prize annually, and the system received the warmest countenance from that enlightened administrator. Dr. Buist truly observed that there were hundreds of cases in which prizes have brought into existence, and fostered through infancy, forms of industry which, without such assistance, would in many cases never have had any being at all. The offer of small prizes for the spread of chinchona cultivation would, I am convinced, be attended by the most satisfactory results.

In concluding this paper, I would once more mention the inestimable blessing which the introduction of fever bark trees has conferred upon India; and I would point to such districts, for instance, as North Canara, where the whole population is decimated by fever, and unable to procure a grain of quinine. As a work of public utility it may advantageously be compared with any that has been undertaken in India for many years—nay, more, it may with truth be said that the success of other works depends upon it in some measure. Even now the progress of the road from the port of Sedasheghur to the cotton district of Dharwar, upon which so much depends, is at a stand-still, owing to the fever which rages at the foot of the hills—those hills which hereafter will be planted with fever-dispelling bark trees. In durability, too, it is equalled by no other work. Long after our roads are obliterated, our canals dried up, our masonry structures in ruins, the virtues of chinchona bark will remind the Hindu of a distant future that the strangers from the West left some blessings behind them when they finally departed from the scene of their labours and their triumphs.

DISCUSSION.

The Chairman said he would now call upon the meeting to discuss the very interesting paper which Mr. Markham had read. There seemed to him to be several portions of the subject on which many present might be able to give information to the meeting. One was as to the particular sort of chinchona plant which produced the greatest amount of quinine, as that appeared to be a matter not yet completely settled. It was quite certain that though Mr. Markham had told them that the red quality of bark produced a large per-centage of quinine—and he believed most manufacturers agreed in that—yet the yellow bark was largely used in hospitals to make decoctions and infusions. Another subject of importance was the sort of chinchona which was most easily grown, and the effects which cultivation in a climate which was not natural to that plant would have upon it. It was possible that what was now considered a very inferior variety of chinchona might, under cultivation, become the best sort in future. He thought it desirable that the experiments now making in India should be tried with as many varieties of this plant as possible. Another question which Mr. Markham had started, and which he (the Chairman) thought was important, was the influence of the prize system which the Government of India had adopted. He should like to hear the opinion of persons connected with agricultural pursuits in India, as to the probable improvement which was likely to occur from the introduction of the prize system amongst the natives of that country. He presumed the advantage of a greater supply of quinine was a matter which they need hardly discuss. Mr. Markham had spoken of the very great importance of that medicament amongst the natives of India, and medical men would agree that it was equally needed by the natives of England. The mention of one or two facts was sufficient to prove that; one was that charitable institutions (hospitals and dispensaries) were obliged, from its price, to refuse it to out-patients, and that no parish doctor could give it, so that a very large proportion of the population could not avail themselves of this valuable drug. It ought not to be regarded merely as a medicine, but was almost an article of food to those who required it. He apprehended there could be no question as to the likelihood of the improvement of this plant by cultivation, but all these matters opened fair ground for discussion, and he would now invite the opinions of those present upon these points.

Mr. Gerstenberg had listened with great attention and interest to the able and instructive paper which had been submitted to them this evening, and he fully appreciated the successful labours of Mr. Markham. It had been stated in the paper, that in about ten years the authorities in India expected to get a return for the outlay in the cultivation of the chinchona, while he understood Mr. Markham to state previously that it took twelve years before the plants yielded quinine fit for consumption. But be that as it might, he wished to call the attention of that gentleman to the circumstance that Dr. Weddell had stated that the bark from the branches was considered to be only of half the value of that which was taken from the trunks of the trees. The consequence was the cascarilleros went into the forests and stripped the trees of their bark from the trunk only, without taking it from the branches. Mr. Markham had alluded to the experiments made in Java, and attributed their partial failure to the planting of the trees in too shady places. He (Mr. Gerstenberg) understood from other quarters that the trees grew very well in Java, but that the yield of alkaloids was not sufficient to be remunerative as a commercial speculation. He hoped the enterprise in India would be more successful. Mr. Markham had been accompanied by Mr. Spruce, who was an excellent botanist, and also by Mr. Pritchett, and he (Mr. Gerstenberg) had every hope that their efforts would be successful. It would certainly be very unfortunate if the amount of quinine produced was not sufficient to pay the expenses,

It had been stated by Mr. Markham, that he considered it impossible to cultivate chinchona trees in South America, but Mr. Spruce had sent to this country a full account of a chinchona plantation in Ecuador, accompanied by a proposition for the formation of an English company to carry out that cultivation. Mr. Spruce had stated that there was no difficulty in getting labour there, and as the plantation was situated several thousands of feet above the level of the sea, the climate was healthy for European labourers, who might be introduced. Mr. Markham had only slightly alluded to the history of this undertaking in India, and he thought the public would be rather curious on that subject. It was stated by Mr. Markham that this subject was laid before Lord Stanley in 1859, and that he entered very warmly into it, but all the honour of carrying out the enterprise had been accorded to the administration of Sir Charles Wood. Sir William Hooker and the late Dr. Royle had used every endeavour to move the Indian Government on this subject, but without success, until Lord Stanley came into office, and he believed it was entirely owing to the quick perception and activity of that distinguished man that the enterprise had been carried out in India. He (Mr. Gerstenberg) had been introduced to his lordship by a gentleman whom Lord Stanley had himself known at Ecuador, and this afforded him an opportunity of urging the matter upon his attention. It was well known that a large tract of land had been ceded by the Republic of Ecuador to a body of gentlemen in this country, in satisfaction of a debt due to a number of British subjects, and in connection with this a company was formed, with which he (Mr. Gerstenberg) was connected. Mr. Spruce had been engaged to examine into the productive capabilities of that property, but his services had been subsequently secured by the Indian Government, and he had acted in concert with Mr. Markham, as had been mentioned in the paper. Mr. Markham had with great modesty stated the part he had borne in this enterprise. He (Mr. Gerstenberg) was surprised at the rapidity with which it had been effected. It was a mission requiring a rare combination of qualifications seldom found in one man, and he believed Mr. Markham was the best person who could have been selected to carry it out. He trusted it would turn out that the plants which had been introduced into India were the right ones, and that the climate of that country would not interfere with the quality of the quinine obtained from them, a question which he believed had yet to be solved.

Captain MUNRO said, allusion having been made by Mr. Markham to the production in the Neilgherries of tea, coffee, and chinchona, a question in which he (Captain Munro) was largely interested, he would make a few observations. The uses of quinine were so well known, and its advantages were so much appreciated in India, where he had resided for a considerable period, that no further remark need be made on that subject. He merely wished at the present moment to look at the matter in a mercantile point of view. It having been stated that these plants would not give a return for ten or twelve years, he thought people would be backward in advancing money for such a purpose. It was, however, to be recollected that any company engaged in chinchona cultivation might grow coffee at the same time, and in that way get a return while the chinchona trees were gradually coming forward. He begged to ask a question with reference to the figures given as the cost of production of this plant. He would ask whether the estimated annual expense of the 160 acres, which was stated at £1,320, included superintendence and all working expenses.

Mr. MARKHAM replied that it did.

Mr. J. E. HOWARD said he had watched this experiment with great interest from its commencement, and was happy to hear on this occasion of the measure of success that had attended it. He considered it a success, because all that Mr. Markham had stated as to the invaluable benefit it would confer upon the natives of India would be fully borne out, but the question of commercial advantage required to be carefully looked into before they could say that the success anticipated would be realised. As he saw several gentlemen present connected with undertakings involving the outlay of capital for the cultivation of chinchona trees, he should be happy to give all the information in his power, so as to avoid the possibility of loss by too rash speculation, as was the case in Java, from circumstances to which he need not refer, except as demonstrating that the very first thing to be considered was to get the right trees—the best species of the plant; and not only the best species, but of these species the varieties which were most productive of quinine. The calisaya species was, in his opinion, the best for producing quinine, but of this it was important to get the best variety, for the difference between one variety and another in this respect was great. He had himself obtained between five and six per cent. of quinine from the best species of calisaya bark, whilst others yielded less than one per cent. That which applied to the calisaya applied also to most of the other varieties that were worth cultivating. He made that observation especially with regard to the red bark which had been so largely introduced into India. He had stated on other occasions that it yielded the largest amount of alkaloids of any species of bark. That was the result of his own experiments with certain varieties of red bark; but it must be understood that the red bark varied from that large production of quinine he had mentioned down to a very low per-centage. He had obtained $8\frac{1}{2}$ per cent. of quinine from the external portion of the best variety of red bark, but this was quite an exceptional produce. There were varieties of red bark which were apparently of little or no value in the market, one of which was, he believed, derived from a variety of the *C. succirubra* called by Mr. Spruce *C. cuchicara*, or "pig's skin," which was a very inferior quality of bark. Before any private individuals invested largely in the plants of the *Chinchona succirubra* in India, it would be well for them to know that Mr. Spruce had obtained the best varieties of that species, especially as some of the plants varied from specimens of the best sorts sent direct to him (Mr. Howard), and described in his recently published work. The effect of change of climate was no doubt also considerable, and the results could not yet be regarded as fully ascertained. The climate most favourable to the production of alkaloids had been well described by Dr. Karsten, of Berlin, who had published a great deal of information on the subject, which might also be found in the work above alluded to. It grew in ravines high up the mountains, where there was little periodicity of growth. When they descended to tracts where the growth was more intermittent, the bark contained a considerably less amount of alkaloids, and when grown in too warm a situation, it was almost valueless. He hoped and believed that the experiment as regarded the climate of India would be successful, but it must yet be regarded as an experiment. He thought the mode of cultivation referred to would be found the best, and in that, as in all other respects, Mr. Markham had made his arrangements well, and had displayed such zeal and admirable qualities as were seldom united in one individual. He could hardly have hoped to have carried his enterprise through so successfully in the face of the immense difficulties he had had to encounter. The chinchona trees would be most valuable to the natives of India, but the question as a commercial speculation was a very different one. Quinine, as they all knew, was a very expensive medicine, and the Indian government had paid very dearly for it, seeing that the cost of that medicament was £37,000 per annum, whilst they might have obtained the same amount of febrifugal power, in the shape of muriate of chinchonine, for a very much smaller sum. Therefore he thought, as a commercial speculation, the growth of chinchonine-pro-

ducing trees would not answer, as the Government did not seem disposed to patronise this medicine. They were differently circumstanced with regard to quinidine, which was almost as expensive as quinine itself, and he believed quite as good a medicine, in support of which he had the testimony of the late Dr. Royle, who administered it to his own family with the best effects. In conclusion, he would say one word with respect to the Dutch plantations of chinchona. It had been reported that they thought of rooting up all the trees of the *Chinchona Pahudiana*, in the value of which they had been greatly disappointed. Although too poor a species to be remunerative to the cultivator, he thought the bark might contain enough alkaloid to make it worth collecting now it was grown, and in this opinion he was supported by Professor Guibourt, of Paris. He would recommend them to gather the bark and send it to the markets of Europe to try the result.

Mr. THOMAS (late of the Madras Civil Service) said having been for fourteen years in charge of the district of Coimbatore and the Neilgherries, where these experiments were made, he was happy to bear his testimony to the energy and ability with which Mr. Markham had carried out this enterprise. He was there when the plants arrived and assisted in introducing them. As president of a committee who had charge of the agricultural gardens in India, he had been very much brought into connection with Mr. McIvor, whom Mr. Markham had mentioned, and he thought the work of the propagation of these plants could not have been placed in better hands. He had visited, in company with Dr. Anderson and Mr. McIvor, the different sites which had been selected for the experiments with the chinchona plants, and he could state that great pains were taken to ascertain the spots which were most likely to be suitable. They perfectly agreed with Mr. Markham's description of them, and Dr. Anderson, whom he considered to be the best Calcutta botanist, had assisted in choosing them. He would add that the system of prizes, referred to by Mr. Markham, was, in his opinion, very advantageous, and had been largely carried out in the Madras Presidency, through the medium of the collectors, in stimulating the natives to cultivate the best qualities of cotton and other commodities. It was his opinion that there would be no difficulty in acclimatising the chinchona in India, as he had himself experimented with great success upon a variety of spices which had never before been grown in that country.

Mr. SAMUEL HOWARD said there was one point connected with this question which should be borne in mind as an important one, and in which the medical man could do much good—that was by employing the much-neglected salts of chinchonine, an alkaloid at one time considered by the medical profession almost of equal value to quinine itself, as had been shown more especially by the experiments of eminent French chemists; but for many years past it appeared never to have been thought of. The consequence was, that barks yielding that article commanded a lower price in the market than those yielding quinine. The salts of chinchonine could be obtained at one-fourth the cost of quinine, and if it was an equally valuable medicine, it was a matter worthy of their attention. He would especially press upon the government the importance of trying either the sulphate or muriate of chinchonine (he should recommend the latter) as a tonic and febrifuge in India. He felt no doubt of its success, and as it might at present be obtained at a low price, they would save largely whilst waiting for the yield of these new plantations. It was still more important to make this experiment, as if it should be proved that chinchonine was not reliable as a febrifuge, though Dr. Macpherson strongly recommended it in the fevers of India, the value of all the chinchonine-producing barks would be very slight.

Mr. P. L. SIMMONDS said they had been favoured by Mr. Markham with some very interesting details on a most important subject, about which too little had been hitherto known. Not only was the subject interesting to the Society in a scientific and commercial point of view, but it was useful to our merchants, who were the principal importers and purveyors of the bark and especially interesting to the fever-haunted countries which were the consumers of the prepared drug. The paper just read to them had already been the means of eliciting some most valuable information from two gentlemen well qualified to speak on the matter. Mr. Gerstenberg, who, from his own knowledge, had given them the history of the origin of the now successful enterprise of chinchona introduction into India, and Mr. J. E. Howard, who as the largest and almost exclusive manufacturer of quinine in this country, and the historian of the chinchona barks, had acquired a world-wide reputation, and would always, therefore, be listened to with respect and attention. It might be interesting, he thought, to furnish to the meeting some particulars calculated to show the progress of our trade in Peruvian bark. Now, tracing the statistics back for a quarter of a century, he found that the average imports in the five years ending with 1840 were 280,000 lbs. In 1845, 5,078 cwt. were received, of which 4,100 cwts. were re-exported. In 1850, the imports had increased to 10,536 cwt., and from that they gradually advanced to 27,598 cwt. in 1856, the largest quantity ever received. Since that period there had been a steady retrogression, to 21,000 cwt. in 1857, 18,000 cwt. in 1858, and 9,000 in 1860. In 1861 there was a partial recovery to 12.477 cwt., of the estimated value of £185,672. Of this, 4,663 cwt. came through New Grenada, 2,121 from Peru, and 1,035 cwt. from Chili. Now, as the whole of the bark was thrown together in the official returns, and there was no classification, it was impossible to say how much of this was fine bark and how much common, or what were the exact sources of supply yearly. Again, if we examined the statistics of the manufactured product, sulphate of quinine, we found that, in 1838, our imports of foreign made, taken for home consumption, were 101,705 ounces, and in the five subsequent years half that amount. In 1861, we imported 81,557 ounces, valued at £25,635, and exported 47,427 ounces. These figures would serve to convey an idea of the importance of the article under discussion, which created a trade whose money value amounted to a quarter of a million sterling. But, as had been well observed, it was in a hygienic point of view that an adequate supply of this bark was of so great importance. To residents in Africa, North and South America, the East and West Indies, an adequate supply of quinine was of importance, and anything which tended to increase the supply of the raw material, and bring down the price of the manufactured article, must be hailed as a boon, in a sanitary point of view, to the world at large. Already we had taken from the western to the eastern world the culture of indigo, cotton and other staples; and, notwithstanding the jealous vigilance of the Peruvians, the alpaca, one of their most treasured native animals, had been successfully introduced and acclimatised in our Australian colonies. Now we had succeeded in introducing numerous varieties of the chinchona tree into British India, and it had also been introduced into other quarters. Besides Java, it was now growing in Penang, Ceylon, and Jamaica, and it was under the care of competent cultivators and good botanists. In January last year he (Mr. Simmonds) had published in his scientific magazine, the *Technologist* the particulars of what had been done in Ceylon and Jamaica in introducing the chinchona plant, and to that he would refer those interested in the subject for specific details. He might, however, state that Mr. Thwaites, the director of the Royal Botanic Gardens in the former island, had now about 1,000 plants growing; and Mr. Nathaniel Wilson, curator of the Botanic Gardens, Jamaica, several hundred. France, Spain, and other countries which had colonial possessions with climates and elevations suitable to the growth of the tree, would do well to turn their attention to introducing it, for it was not England alone that was interested in

this matter; the United States and France secured a very large proportion of the bark of commerce. Care should, however, be taken in choosing suitable localities, such as steep declivities or mountain tops, for Poeppig, one of the most reliable authorities on chinchona had stated, that wherever the valleys were close and warm the produce deteriorated so much in virtue as to be nearly worthless in the market. While on this subject, conjointly with our efforts to extend the cultivation of the chinchona, we should not lose sight of the desirability of discovering and testing the virtues of other febrifuge plants, for it was very doubtful whether the green bark or the prepared alkaloid would ever become so cheap or plentiful as to be brought within the reach of the poor millions of India. One of the highest medical authorities stated, that every country spontaneously furnishes remedies for those maladies which the people of the soil were naturally subject to—salicine, quassia, and many other succedanea, were all useful. Tropical jungles, moreover, abounded with plants which might be converted into useful febrifuges, and many of these had already a local reputation which should be tested without prejudice. A kind Providence had scattered in all directions the means of removing a disease which might be regarded as more or less endemic, and to the cure of which, by medicines procured on the spot, our efforts ought to be directed. But as the European pharmacopœia afforded the necessary drugs, although at a high price, for combating the many ills to which flesh is heir, few looked beyond it for any new remedies, or for efficacious substitutes for those already in use. We were too satisfied with possessing so powerful and invaluable a remedy as the disulphate of quinine; and with the present facilities for procuring it, we felt little inclined to extend our researches with a view to discover useful native febrifuges. Dr. Lindley had well observed that "no one will be bold enough to assert that the physician already possesses the most powerful agents produced by the vegetable kingdom, for every year is bringing some new plant into notice for its energy, while others are excluded because of their inertness. In tropical countries, where a fervid sun, a humid air, and a teeming soil, give extraordinary energy to vegetable life, the natives of those regions often recognise the existence of potent herbs unknown to the European practitioner." In conclusion, he would, individually, thank Mr. Markham for his energetic and successful labours in this important field, and for the condensed account he had furnished to them relating to the habitat, produce, and attempted culture of this most important natural order of plants, accompanied as it was by much recent statistical detail not to be found in the consular reports already published.

Mr. D. Hanbury expressed a hope that some gentlemen present would be able to answer the question whether there was good evidence as to the possibility of extracting alkaloids in any quantity from the bark of the young wood, as obtained from the shrubby form of tree in which Mr. Markham proposed to grow it? As far as he at present knew there was only one species of chinchona which was cut as a shrub for the sake of its bark; that was *C. condaminea*, yielding Loxa bark, which was poor in alkaloids, but when it obtained the dimensions of a tree, as it did in ancient times, the bark, he believed, was rich in alkaloids, in consequence of which it had maintained a sort of hereditary reputation.

Mr. J. E. Howard said the properties of the Loxa bark had been correctly stated by Mr. Hanbury, but the question was different as to the calisaya. He had seen many importations of the *Chinchona calisaya* which had been peeled from very small branches, and forming small quills, which were sufficiently rich to be very well worth working, and of a quality beyond some of the flat bark of larger trees. That was connected with the question of varieties, because in some of those cases he found that the samples were peeled from a peculiar form of the calisaya bark growing high up the mountains, and which had yet to be introduced into India. He very much regretted that the government had not thought proper to send a steamer across to the coast of Peru to receive Mr. Markham and his precious cargo of plants upon their arrival there, as this would have been the means of saving a very large number of plants of the best varieties, which were perhaps irrecoverably lost to India.

Dr. Berthold Seemann, having passed a considerable period of time in Ecuador, was, on his return to this country, impressed with the great importance of cultivating the chinchona trees. The neighbourhood of Loxa, once rich in these trees, was now entirely stripped of them. In long ranges of country, which formerly yielded rich harvests of bark, not a stick of chinchona was to be found. He thought the honour of the first endeavours to introduce the chinchona into India was due to the late Dr. Royle, who, though unsuccessful, strongly urged it upon the Government. In 1854, he (Dr. Seemann) took up the question in a book which he wrote, and also in articles in the *Pharmaceutical Journal*. The statement made by Mr. Gerstenberg was correct in all its details, and he believed unless Mr. Markham had taken up the question, and brought his great energy to bear upon it, the matter would never have been carried out by the Government in the way it had been. Having travelled a great deal in the region described by Mr. Markham as the scene of his researches, he could appreciate the enormous difficulties that gentleman had surmounted. He joined in the regret just expressed that a vessel was not in readiness to receive Mr. Markham and his valuable cargo, upon his having brought it safely to the Peruvian shores, through difficulties which could scarcely be described. He had every confidence that the experiment in India would be successful, and the greatest honour was due to Mr. Markham for the way in which he had carried it out. If that which was stated by Sir W. Denison was correct—and he was a good naturalist as well as a good statesman—they might expect to see the chinchona grown in India to an extent commensurate with its great importance and value to the people of that country.

The Chairman then proposed a vote of thanks to Mr. Markham for his valuable and highly interesting paper.

The vote of thanks having been passed,

Mr. Markham said that he would address a few remarks to the meeting in reply to some of the statements and inquiries that had been made in the course of the discussion. With regard to Mr. Gerstenberg's account of the Ecuador Land Company, he only thought it necessary to touch upon one point, namely, the conduct which had been unjustly imputed to Mr. Spruce. That distinguished traveller, than whom a more honorable and single-minded man did not exist, had distinctly stated that he had made no engagement whatever with the Ecuador Land Company when he (Mr. Markham) secured his services, and the correctness of his statement might be implicitly relied upon. He (Mr. Markham) had not lately heard any news respecting the doings of the Ecuador Land Company, but he would be glad to find that they had commenced chinchona, or, indeed, any other cultivation. The very interesting remarks from Mr. Samuel Howard, respecting chinchonine, were particularly important in connection with bark cultivation in India, because the grey bark species had been introduced, and were likely to succeed. Mr. Markham, in reply to some remarks of Mr. Simmonds, stated the sources of information from which he had procured his accounts of the exports of bark, and he drew the attention of the meeting to the fact that many careful experiments had been made, with a view to ascertain the febrifuge efficacy of indigenous plants, such as the bonduc nut, neem bark, and the berberry, but that all investigations had ended in the conclusion that there was no febrifuge that could for a moment be compared with quinine in value. In reply to Mr. Hanbury's inquiries, Mr. Markham pointed out that the quill-bark from Loxa was procured from very small shrubs indeed, and could

not, therefore, be compared with the bark that would be obtained from the large spreading shrubs, twelve feet apart, which would be cultivated in India. He concluded by thanking the meeting for the kind way in which his paper had been received.

The Secretary announced that next week being Passion Week, the Society would not hold a Meeting; and that on Wednesday evening, the 8th April, a Paper, by Mr. Edwin P. Alexander, "On the Sewing Machine; its History and Progress," would be read.

PROPOSED INTERNATIONAL SCHOOLS.

The recent International Exhibition seems naturally to have led to the discussion, amongst the many distinguished men of different nations then in this country, of various plans for removing national prejudices.

M. Barbier, a French manufacturer, placed at the disposal of the French Committee of the International Exhibition, a sum of 5,000 francs, to be given in prizes for the best Essays on the means of establishing international education in Europe.

An international jury, of which, among others, Mr. Richard Cobden, M. Michel Chevalier, Sir James Kay Shuttleworth, and Dr. Johnson, were members, have examined the Essays, and have just published a report, which shows both the object in view and the best means of carrying it out.*

It is proposed to form a European Company, including the most distinguished men in England, France, Germany, and Italy, for the purpose of establishing a college, or rather school, in each of the four great countries of Europe.

Each of these colleges would receive children of the four nations, at an early age, in equal numbers. These children, thus living together, would very quickly teach each other their respective languages; firstly, by constant practice; secondly, by classes, which would be formed in accordance with a plan as ingenious as it is new.

The method proposed is as follows:—

To each boy a book would be given, which would contain those sentences most frequently used in conversation, expressed in the four different languages. The boys would be divided into groups of four, each group being formed of one boy from each nation. The English boy would read aloud a sentence in English, after which it would be read aloud in the same language by each of the other boys—the English boy acting the part of a teacher, and correcting their pronunciation. The French boy then assumes the part of a teacher, the other boys acting as pupils; the same sentence is read over in French, and corrected in the same manner, and so on for German and Italian. In this manner children would acquire a great many words, and when just beginning to understand and speak—which would require only a few weeks—they would every day be made to speak a different language during their play hours. The study of grammar would not begin until the children were able thoroughly to understand the professor in any of the four languages he might employ.

To make them perfect in the use of languages the different branches of education would be taught each in a different language.

At the end of every year the pupils would change colleges, and consequently the country they inhabited. But in all these colleges, the discipline, direction, and rules would be exactly alike; so that a boy going from one college to another, would be certain to find there the continuation of the studies he had begun. Relatives of children would, besides, have the certainty that the colleges in the other countries were the exact counterpart of what they would have near them.

On the all important subject of religion, the most perfect guarantees would be provided. Effectual means would be taken to insure the most complete supervision of parents or ministers appointed by them.

It appears that distinguished men in England have taken the lead in this movement, and the system seems well worth a trial. In these colleges children of all nations could be educated together, and would learn, almost in playing, different languages, and would become acquainted, by staying in different countries, with the habits and manners of foreign nations. The time necessary for acquiring the complete knowledge of modern languages, which forms so important a branch of education, would be in a great degree saved; national prejudices and antipathies would be modified, a new generation, endowed with more liberal and enlightened views would be formed, the whole tending to the promotion of peace and social progress in the various nations.

* Published by Dulau, Soho-square.

Home Correspondence.

NAVAL CONSTRUCTION.

Sir,—The recent debates upon the construction of our war vessels evidence the uncertainty of the course that is to be pursued. I venture, therefore, upon a repetition of the opinions I have long entertained, and which I have occasionally expressed to you upon the changes in naval warfare induced by the application of steam power to nautical purposes, and which are being verified by the doings of the *Alabama*.

I do contend, as I have for many years past, that supremacy upon the ocean will mainly depend upon the speed of vessels—not upon their magnitude, structure, or heavy armament of cannon. It would, I believe, be something like certain destruction to any monster war vessel to pursue such a vessel as the Confederate rover if she were armed with submarine explosive shells in addition to her cannon, presuming that such shells are of some simple form, of easy application, properly charged, and the management of them thoroughly understood.

With regard to the speed of vessels adapted to the service of shells, they would, I think, have, in the attainment of that essential, a great advantage over vessels of ordinary form. The upper or weather deck of a shell vessel would be perfectly flush, with no bulwark above it; only stanchions and nettings to prevent those on deck from falling overboard, with weather cloths when needed; there should be nothing to hold wind that might be detrimental to speed. Shell vessels might, in addition to their principal arm, have one or two guns to bring-to a merchandise or unarmed vessel. The gun, or guns, when used for such or any other purpose, would be hoisted up from the main deck on to the upper or weather deck, and fired over all.

Vessels so completely covered in would be enabled to encounter, without risk of foundering, any amount of rough weather. Sails, under such conditions need not be used, neither would steam be required, for the vessel's bow may be kept as near to the wind as may be desired by the use of a float anchor, and, so bowing the sea, would avoid the dangers incidental to lying-to under canvas.

Shell vessels for home service should, I think, be wholly constructed of iron; while for foreign service I should, in the present difficulty of preventing corrosion and fouling of iron vessels for long periods, very much prefer wood and copper in the construction of shell vessels intended for foreign service or long cruises. Vessels on such service

would be accompanied by "a waggon train" of vessels of burden to carry supplies.

In conclusion, I would remark that the subject of submarine explosive shells is not yet generally understood, but it is, nevertheless, of great national importance, and the sooner it receives the attention of those to whom our defences are intrusted the better will it be for England.

I am, &c.,

J. HARVEY, Capt. R.N.,

5, Keynsham-place, Cheltenham, March 14th, 1863.

THE PATENT LAWS.

Sir,—In a former letter, I took the liberty of calling attention to the indiscriminate manner in which patents are granted. There is no investigation; anything, good or bad, old or new, indeed any one who can pay the fees may have a patent, so that the patent is granted to money, not to merit; indeed, it appears that all is fish that comes to the net of the Patent Office. For instance, an application is made to patent a newly invented pill, or some other kind of mixture, to be called a "Patent Medicine;" it is granted, and, as far as we know to the contrary, without having its curative qualities tested, or even its fitness for the human system, or the originality of the compound (on which alone its claims to protection should rest) certified to by competent medical authority. Now, this point affects the public in a most important degree, because thousands of people regard Royal Letters Patent as a moral guarantee of the stuff's ability to do all it generally professes to do, and that is, to cure every description of disorder that "flesh is heir to," and any mistake in this respect must not only be injurious to their own health, but detrimental to the legitimate practitioner.

It would be interesting for the public to know, and they ought to know, how the Patent Office authorities test medicinal inventions, for in such cases the utmost caution should be observed, especially as they are not manufactured by recognised practitioners—at least, I believe not—for the medical profession do not countenance such preparations. We never hear of an M.D., or an F.R.C.S., telling patients to take patent medicines, and I do not believe that they are used in the hospitals or dispensaries. Such being the facts, the following questions present themselves:—Are patent medicines the actual and original inventions of the patentees? and if so, are the inventions of such beneficial importance to the public as to entitle the inventors to the protection of the Crown? If they really possess the advantages claimed for them, why are they not used in the army, navy, and general hospitals? And, on the other hand, if they are good for nothing, what right have they to a patent, which is bought only to use as an advertisement to gull the public and injure the medical profession. I am not a medical man, so what I say does not arise from any pecuniary interest in the matter. Nor have I ever been injured by patent medicines, for I never took any; but what I really mean to urge is, that before a patent is granted for a medicine, a competent medical board should certify to its originality and efficacy, and that neither the Stamp Office nor the Patent Office should be permitted to legalise quackery. I hope that these points will receive the attention of the commission now sitting.

I am, &c., GEORGE ELLIS.

March, 1863.

Proceedings of Institutions.

Bank of England Library and Literary Association.—The thirteenth annual report states that the prosperity of the last twelve months has been fully equal to that of any previous year. The number of subscribers for the year 1862-3 has been 484, making, with 14 life-members, a total of 498. The number of books now in the library is 9,683, 418 of which have been added during the past year; viz., 353 new volumes, 50 volumes of magazines, and 15 volumes purchased to replace worn out copies. This increase is slightly less than that reported last year, which is to be accounted for by the fact that a small part of the income of the association has been applied to opening a subscription with the "London Library Company." Early in the year it was deemed advisable to subscribe £5 5s. to that company, which course was found to be so advantageous to the association, that it was soon after determined to increase the subscription to £10 10s.; at the same time, however, decreasing that to Mudie's Library to the same amount, instead of allowing the latter to remain at £15 15s., thus making the subscription to each library £10 10s. The advantage of this arrangement is that the librarians are enabled to obtain a larger number of copies of new and popular works than they were when the subscription was confined to one establishment. The committee have purchased 86 volumes of works of permanent value and interest from Mudie's surplus stock. The committee have again thankfully to acknowledge the liberal donation of £20 from Mrs. Thwaytes through the president, and also the usual annual donation of £1 1s. from the long-continued friend of the association, I. M. Parsons, Esq. They also express their thanks to many gentlemen who have testified their interest in the success of the association by the gift of books, &c. The new catalogue of books has been completed, and is now in the hands of the members. In making this announcement they desire gratefully to acknowledge the liberality of the governors of the Bank in having allowed the catalogue to be printed in the establishment, and thereby enabled the committee to supply to the members a handsomely printed volume at a very moderate price. They also desire to express their acknowledgments to Mr. Coe, the superintendent of the printing department, for the typographical beauty of the work; to the librarians for their great zeal and care in its compilation, and to Mr. J. B. Scott for his kindness in assisting to bring so laborious a task to a successful issue. The committee draw attention to the fact that not a single book is missing from the library, although the circulation in two years has amounted to 63,000 exchanges. In conclusion, the committee record their conviction that the advantages of the association are increasingly appreciated by the subscribers, in proof of which they refer to the increased attendance in the reading-room, and to the large circulation of books, the number of exchanges during the year having amounted to about 35,000, being an average of more than 70 volumes to each member. The financial statement of the year ending 26th February, 1863, states that the receipts have been £303 13s. 5d., and that there remains a balance of £13 12s. 2d.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Actuaries, 7.
Medical, 8½. Clinical. Dr. Palfrey, "On Obstructive Dysmenorrhæa treated by Incision of the Cervix Uteri," and other communications.
Chemical, 8. Anniversary Meeting.

Tues. ...Civil Engineers, 8. 1. Mr. Daniel Miller, "Structure in the Sea, with a Description of the Works of the New Albert Harbours at Greenock."
Royal Horticultural, 12. Floral Committee.

Wed. ...Geological, 8. Mr. James Fergusson, "On Recent Changes in the Delta of the Ganges." Communicated by the President.
Pharmaceutical, 8.

Thurs...Linnæan, 8. 1. Mr. Blackwall, "On some Remarkable Facts in the Physiology of Spiders and Insects." 2. Mr. Murray, "Monograph of the *Nitidulidæ*." 3. Dr. Salter, "On a Sexual Monstrosity in the genus *Passiflora*."

Fri.......Philological, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 3rd March, 1863.

Par. Numb.
29. Railway and Canal, &c. Bills (53. Aberystwith and Welsh Coast Railway; 54. Banff, Macduff, and Turriff Extension Railway; Banff, Portsoy, and Strathisla Railway; 55. Barnet and Great Northern Junction Railway; 56. Bristol and North Somerset Railway; 57. Carnarvonshire Railway; 58. Cork and Youghal Railway; 59. Edinburgh and Dunfermline and Perth (North Brtish) Railway; Edinburgh and Glasgow Railway; 60.

Delivered on 4th March, 1863.

62. Hops—Return.
55 (2). Civil Services—Estimates, Class 2.
46. Bill—Assurances Registration (Ireland).
29. Railway and Canal, &c., Bills (61. Furnace and Midland Railway; 62. Furness Railway and Barrow Harbour; 63. Great Northern Railway (Cheshire Lines); 64. Great Northern Railway (Owston to Cottam): 65. Great North of Scotland Railway (Aberdeen Junction); 66. Guildford and Leatherhead Railway; 67. Hemel Hempsted and London and North Western Railway; 68. Hoylake Railway; 69. Inverness and Aberdeen Junction Railway; 70. Kendal and Ulverstone Junction Railway; 71. Launceston and South Devon Railway; Leominster and Kington Railway; 72. Letterkenny Railway)—Board of Trade Reports.

Delivered on 5th March, 1863.

72. Army Estimates, 1863-64—Paper.
83. Navy (Advantages of Iron and Wood in the construction of Ships)—Statement.
77. Durham University—Return.
45. Bill—Admiralty Court (Ireland).
Poland—Correspondence in 1856.
29. Railway and Canal, &c., Bills (73. Llanelly Railway and Dock; 74. London and Epsom Downs Railway; 75. London and Brighton and South Coast Railway (Dorking to Leatherhead); 76. London and Brighton and South Coast Railway (Extensions and Alterations, &c.); 77. Metropolitan, Tottenham, and Hampstead Railway; 78. Midland Railway (Extension to London), Mangotsfield to Bath); 79. Milford Railway; Milford Haven Dock and Railway; 80. Montrose and Bervie Railway; 81. North Eastern Railway (Hull and Doncaster Branch); 82. Norwich and Spalding Railway (Powers to Great Northern Railway Company) (Wisbeach Extension); 83. Peterborough, Wisbeach, and Sutton Railway; 84. St. Ives and West Cornwall Junction Railway; 85. Seaton and Beer Railway; 86. Somerset Coal Railway; 87. South Yorkshire Railway; 88. South Yorkshire Railway (Hull Extension); South Yorkshire Railway and River Dunn (Transfer, &c.; 89. Tendring Hundred Railway; 90. Victoria Station and Pimlico Railway)—Board of Trade Reports.

Delivered on 6th March, 1863.

45 (1). Trade and Navigation Accounts (31st January, 1863).
65. Duchy of Lancaster—Account.
75. Poor Law (Patrick Bourke)—Return.
47. Bill—Metropolis Turnpike Roads Acts Amendment.
Brazil—Further Correspondence.
Canada (Militia Bills)—Copies or Extracts of Correspondence.
29. Railway and Canal, &c., Bills (91. Whitehaven, Cleator, and Egremont Railway; 92. Working Dock: 93. Brecon and Merthyr Tydfil Junction Railway; 94. Brecon Junction Railway; 95. Buckley Railway; 96. Busby Railway; 97. Cork and Kinsale Junction Railway; 98. Devon Valley Railway; 99. Drayton Junction Railway; 100. Dungarvan Harbour, Markets, and Improvement; 101. Hayling Railways (Abandonment); 102. Holbeach North Junction Railway—Board of Trade Reports.

Delivered on 7th and 9th March, 1863.

50 (2). Railway and Canal Bills—Third Report from the Genera Committee.
84. Salmon Fisheries (England and Wales)—Second Annual Report of the Inspectors.
50. Bills—Gardens in Towns Protection.
51. ,, Hares (Ireland).
52. ,, Burials.

Delivered on 10th and 11th March, 1863.

42. Bed of the Sea, &c.—Return.
48. Woods, Forests, and Land Revenues—Abstract Accounts.
58. Army (Artillery Officers)—Returns.
74. Dulwich College—Returns.
78. Pier and Harbour Act—Board of Trade Report.
79. Coals (Woolwich and Portsmouth—Return.
82. Hainault and Epping Forests—Return.
85. Army—Return.
86. Navy (Iron-cased Batteries)—Return.
41. Bills—Diseases Prevention (Metropolis).
53. ,, English Church Services in Wales.
54. ,, Bakehouses Regulation.
55. ,, Naval Coast Volunteers Act Amendment.
56. ,, Tobacco Duties (amended) P. M.)
China—Further Papers Relating to the Rebellion.
29. Railway and Canal, &c., Bills 103 Inverness and Perth Junction and Perth and Dunkeld Railway Companies; 104. Inverness and Perth Junction Railway; 105. Knighton and Central Wales Railway Companies; 106. London, Brighton and South Coast Railway (South London, Tooting, &c., Junction Railway); 107. London, Chatham, and Dover Railway (No. 2); 108. London, Tilbury, and Southend Railway; 109. Ogmore Valley Railways; 110. Sidmouth and Budleigh Salterton Railway; 111. Teign Valley Railway; 112. Uxbridge and Rickmansworth Railway; 113. Watford and Rickmansworth Railway; 114. West Cork Railway; 115. West Drayton, Staines, and Woking Junction Railway; 116. Wimbledon and Streatham Railway; 117. Isle of Purbeck Railway; 118. Isle of Wight Railway Extensions; 119. Landport and Southsea Tramway; 120. London and North Western and Lancashire and Yorkshire Railway Companies; 121. Londonderry Railway (Seaham to Sunderland): 122. Marshland Smeeth and Fen District Drainage; 123. Newhaven Harbour and Ouse Lower Navigation; 124. Penarth Harbour, Dock, and Railway)—Board of Trade Reports.

Delivered on 12th March, 1863.

29. Railway and Canal, &c. Bills (125. Wexford and Enniscorthy Railway); Board of Trade Report.
73. Army (Distinguished Service Colonels)—Return.
49. Bill—Borough Residence Measurement.

Delivered on 13th March, 1863.

55. (6). Civil Services—Estimates (Class iv).
88. Licensed Victuallers—Return.
90. Army (Extra Receipts)—Return.
91. Army (War Department)—Return.
92. Malting Licenses—Return.
North America—Correspondence relating to the Civil War, No. 1.
North America—Correspondence with Mr. Mason, No. 2.
North America—Correspondence respecting the "Alabama," No. 3.

Delivered on the 14th and 16th of March, 1863.

76. East India (Public Work Department)—Returns.
93. Fortifications Loan Act—Return.
96. Change of Name—Copies of Correspondence.
71. Metropolitan Police—Accounts.
57. Bills—Telegraphs (amended on re-commitment).
58. Bills—Inclosure.
59. Trustees (Scotland) Act Amendment.
Poland—Correspondence.
29. Railway and Canal, &c., Bills—(127. Bristol Docks; 128. Bristol and Portishead Pier and Railway; 129. Bristol Port and Channel Docks; 130. Bristol Railways Junction Railways; 131. Cardiff and Caerphilly Railway; 132. Colne Valley and Halstead Railway; 133. Glasgow and South Western and Ayr and Maybole Junction Railway; 134. Great Western (Branch at Great Bridge) Railway; Greenock and Wemyss Bay Railway; 135. Lancaster Canal and London and North Western Railway; 136. Manchester and Milford Railway; 137. New Milford Docks; 138. Southampton and Netley Railway; 139. Wear Navigation and Sunderland Docks);—Board of Trade Reports.

Delivered on 17th March, 1863.

89. Great Yarmouth B ttery—Return.
19. Metropolitan Board of Works—Report.
104. Poor Law (Patrick Brophy)—Return.
39. Bills—Marriages Reg stration (Ireland).
60. Bills—Borough Residence Uniform Measurement.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, March 20th*, 1863.]

Dated 11th February, 1863.

378. H. Wycherley, Oldbury, Worcestershire—Certain imp. in the construction of and mode of applying wings or dirt screens over the wheels of carriages.

Dated 13th February, 1863.

386. S. M. Innes, Hill-house-hill, Millbrook, Hampshire—Imp. in the construction of pianofortes.

Dated 14th February, 1863.

397. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in lever horse-power machines, the cog-gearing employed being applicable to other machines. (A com.)
399. J. C. Jeffcott, Anglesey-street, Cork, Ireland—Imp. in the production and generation of gases, and also in apparatus connected therewith.

Dated 19th February, 1863.

453. W. Sherwood, Birmingham—An imp. or imps. in wine glasses.
455. R. Pinkney, 18, Bread-street-hill—Imp. in the manufacture of metallic pens.
457. W. Trustrum, 2, Marlborough-road, Old Kent-road—Imp. in the manufacture of oiled silk.

Dated 20th February, 1863.

459. H. B. Barlow, Manchester—Certain imp. in weaving, and in the machinery employed therein. (A com.)
461. W. Marsden, 49, Old Bailey—Imp. in buttons and other similar fastenings, and in the modes of attaching or securing the same.

463. J. Bentley and H. Booth, Pilkington, Lancashire—Imp. in looms for weaving.
465. W. Hainsworth, Rothwell, near Wakefield, Yorkshire—Imp. in the manufacture of cast iron pipes, columns, or any description of tubing.
467. W. Clark, 53, Chancery-lane—An imp. in boilers for disintegrating and pulping vegetable substances. (A com.)
469. F. W. Benndorf, Chemnitz, Saxony, Germany—Imp. in governors or apparatus for regulating the speed of steam engines or other engines for driving machinery.

Dated 21st February, 1863.

471. C. Malpas, Soho Mills, Tunstall, Staffordshire—Imp. in ovens or kilns for firing, burning, or baking pottery, bricks, tiles, and other earthen or ceramic articles.
473. H. Kilshaw, Haslingden, Lancashire, and T. Elce, jun., Manchester—Certain imp. in machinery for preparing and doubling cotton and other fibrous substances.
475. E. T. Hughes, 123, Chancery-lane—Imp. in the treatment of colouring matters derived from tar for the purpose of making them applicable for painting. (A com.)
477. A. H. Remond, 4, Moorgate-street—Imp. in preserving provisions, and in the apparatus employed for such purpose.
479. W. Wood, Monkhill, near Pontefract, Yorkshire—Imp. in the process of manufacturing pomfret or liquorice cakes, rolls, sticks, and pipes, and other similar articles of confectionery.
481. J. Brown, Sheffield—Imp. in the manufacture of armour plates for ships and other structures. (A com.)
483. W. E. Newton, 66, Chancery-lane—Imp. in the construction of wind instruments of music. (A com.)

Dated 23rd February, 1863.

485. W. H. Gauntlett, Middlesbro'-on-Tees—Imp. in apparatus for heating the blast in the manufacture of iron.
487. J. Eckersley, Westhoughton, Lancashire—Imp. in spinning and doubling silk.
489. J. P. F. Datichy, Margaret-street—Imp. in steam engines.
491. R. Martindale, Birmingham—Imp. in lamps and burners, and in apparatus employed for milling or ornamenting parts of lamps, which apparatus may also be applied to other similar uses.
493. T. Dickens, A. L. Dickens, and H. Heywood, Middleton, Lancashire—Imp. in ornamenting plush and other such textile fabrics.
495. J. Erwood, 91, Goswell-street—Imp. in producing imitation gilding on paper hangings and other surfaces, also in metal leaf and metallic or bronze powder suitable for the purpose.

Dated 24th February, 1863.

497. D. Spink, Spaxton, near Bridgewater, Somersetshire—Imp. in the construction and arrangement of armour plates for ships.
498. W. Whitehead, H. Whitehead, and H. Barber, Sheffield—Imp. in the manufacture and securing of cutlery handles, and machinery employed therein.
501. G. Davies, 1, Serle-street, Lincoln's-inn—An imp. in melting and smelting furnaces. (A com.)
505. W. Hooper, Mitcham, Surrey—Imp. in insulating and protecting telegraphic and other wires and rods, and in machinery connected therewith.
507. E. R. Walker, Haigh, near Wigan, Lancashire—Imp. in valves, and in apparatus connected therewith.
509. G. A. Huddart, Brynkir, Carnarvon—Improved means of imparting heat to fluids.
511. T. Mallinson and J. Livingston, Manchester—Imp. in throstle spinning and doubling frames, wholly or partly applicable to roving and slubbing frames.
513. G. Bower and W. Hollinshead, St. Neot's—Imp. in apparatus for the production and transmission of gas or other fluids.
515. W. H. Lapthorn, Broad-street, Portsmouth—Imp. in reefing and furling ships' square sails.

Dated 25th February, 1863.

517. F. A. Gatty, Accrington—Imp. in printing and dyeing cotton and other fabrics.
518. R. Maynard, Whittlesford, Cambridgeshire—Imp. in portable chaff cutting machines.
519. R. A. Brooman, 166, Fleet-street—Imp. in lamps for burning petroleum and other similar oils, and in feeders or cans for supplying such oils to lamps. (A com.)
521. W. Readman, Glasgow—Imp. in the manufacture of carbonate of magnesia, and of iodine and kelp salt, and other products from kelp.
523. J. B. Green, Hayle Mill, Maidstone—Imp. in the manufacture of paper.
525. J. Gailey, Princes-street, Chelsea—Imp. in apparatus for the purpose of supplying air for mixture with gases and other aeriform fluids.
527. H. H. Henson, 13, Parliament-street, Westminster—Imp. in mats.
529. W. E. Newton, 66, Chancery-lane—Imp. in producing stereotype plates for printing purposes. (A com.)
531. N. Thompson, Abbey-gardens, St. John's Wood—Imp. in machinery for sawing wood.
533. A. Macivor, Edinburgh University—Imp. in veneering or overlaying woods according to two methods, 1st, by means of steam exhaustion or steam pressure, or air exhaustion or air pressure; 2ndly, by the employment of electro-magnetism.

Dated 26th February, 1863.

537. C. Ritchie, South-street, Finsbury Market—An improved machine for making spiral lighters or spills from wood or other substance, and which machine will make and colour them when desired at one process or operation.
539. W. A. Wilson and J. Smith, Liverpool—Imp. in furnace firegrates.
541. A. P. Price, 47, Lincoln's-inn-fields—Imp. in the production and manufacture of blue colours. (A com.)
543. P. Spence, Newton Heath, Manchester—Imp. in the manufacture of potash, alum, and other salts of potash.
545. M. Puddefoot, Blisset-street, Greenwich—Imp. in implements for tilling and cultivating land.
547. R. J. Nodder, Liverpool — Imp. applicable to hats, caps, helmets, military head dresses, and other like coverings for the head.

Dated 27th February, 1863.

549. J. H. Albinson and H. H. Cocker, Bolton—Imp. in spinning, doubling, throwing, and reeling silk, and in the machinery employed therein.
552. E. T. Hughes, 123, Chancery-lane—Imp. in machinery or apparatus for doubling or twisting yarn, thread, braid, rope, or similar articles. (A com.)
553. J. Carver, Nottingham—Imp. in the arrangement or fixing of combs in machines employed in the manufacture of bobbin net or twist lace.
555. J. Fry, Chesham, Buckinghamshire—Imp. in mashing machinery used in making fermented liquors.
558. William Gray, Sheffield—Imp. in the manufacture of beaters for thrashing machines.
559. W. Clark, 53, Chancery-lane—Imp. in pumping and forcing water, and in apparatus for the same. (A com.)
561. J. H. Johnson, 47, Lincoln's inn fields—Imp. in machinery or apparatus employed in the preparation or treatment of hemp and other textile materials. (A com.)

Dated 28th February, 1863.

562. B. West, 2, St. James's-walk, Clerkenwell—An imp. or imps. in metallic pens.
563. G. Royle, 32, King-street, Cheapside—A new or improved apparatus for creasing or marking rouches.
564. W. Hadfield, Bolton—Imp. in steam boilers, and in the arrangement of flues in connection therewith.
565. J. W. Friend, Freemantle, Southampton—An improved gas-meter.
567. J. Maxfield, Warrington, Lancashire—Certain imp. in brewing, and in apparatus employed therein.
568. S. Williamson, Sheffield—Imp. in the construction of furnaces.
569. D. Collinge, Oldham—Imp. in machinery or apparatus for cleaning, steaming, and preparing cotton or other fibrous materials to be spun.
570. E. Paine, Liverpool—Improved apparatus for facilitating the cleaning of vessels' bottoms while afloat.
571. T. E. Symonds, Adam-street, Adelphi—Imp. in the construction of screw propelled ships, and in the arrangement and mode of disconnecting, with drawing and lifting screw propellers.
572. J. Penn, Greenwich—Imp. in escape or relief valves to the cylinders of marine and other steam engines.
573. J. Courtenay, 9, Down-street, Piccadilly—Imp. in obtaining motive power. (A com.)
574. E. Hayes, Stoney Stratford, Buckinghamshire—Imp. in supplying water to surface condensors of marine engines.
575. S. Bateman, Low Moor, near Bradford—Imp. in the manufacture of wire rope and cordage, and in the machinery employed therein.
576. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in sewing machines. (A com.)

Dated 2nd March, 1863.

577. O. Murrell, Bethnal-green road—Improved arrangements for generating steam in steam boilers and other vessels, and for heating the liquid contents thereof.
578. F. Tolhausen, 17, Faubourg Montmartre, Paris—Imp. in cloth blankets and other fabrics, to be used in machinery for printing fabrics, paper hangings, and letter press. (A com.)
579. J. W. Burton, Leeds—An improved mode of refining and purifying oils.
581. G. Hawksley, Sheffield, and T. Bissell, 75, Tooley-street—Imp. in powder chargers.
582. E. Habel and E. Suckow, Manchester—Certain imp. in machinery or apparatus for preparing, spinning, and doubling cotton and other fibrous substances.
583. T. Taylor, 7, Wellington-row, Bethnal-green—The manufacture of a new or improved fabric, and its application to the formation of ornaments for fire-stoves and other decorative purposes.
584. C. Garton, Bristol—An improved method of applying heat in the manufacture and refining of sugar, and in malting, hop drying, brewing, distilling, and vinegar making.
585. J. S. Wells, Mount-street, Nottingham—Imp. in the manufacture of stockings and other looped fabrics made in knitting machines.

Dated 3rd March, 1863.

587. T. E. Symonds, Adam-street—Imp. in the apparatus for steering ships.
588. T. Emmott, Vale Mills, Oldham—Certain imp. in mules for spinning and doubling.
589. R. Saunders, Croydon—Imp. in metal sheathing for ships and vessels, and in the securing of such sheathing thereto.
590. G. F. Lyster, Liverpool—Imp. in mooring buoys.

591. R. H. Jones and J. Abrahall, Birmingham—Imp. in bracelets and brooches.
592. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in polishing or giving a lustre to soap, and in the apparatus employed in such process. (A com.)
593. J. Henderson, Bradford—Imp. in machinery or apparatus for the manufacture of carpets and other piled fabrics.
595. J. Sibert, Nottingham—Imp. in apparatus for winding and measuring lace.
596. G. Lamb, 9, America-square, Minories—Imp. in apparatus for recording the revolutions of the propelling shaft of a steam ship or vessel.
597. T. Erich, 77, Newgate-street—Imp. in machinery for pressing peat. (A com.)
598. D. B. Parsons, 77, Upper Thames-street—Imp. in reaping and mowing machines. (Partly a com.)
599. B. S. Cohen, 9, Magdalen-row, Great Prescott-street, Goodman's-fields—Imp. in apparatus for protecting the points of pencils.
600. W. Parsons, Earl-street, Edgware-road—Imp. in dining tables.

Dated 4th March, 1863.

602. C. M. Palmer and J. McIntyre, Jarrow, Durham—An improved mode of applying and fastening metal sheathing to the bottoms of iron ships or vessels, and to iron for other uses.
606. T. H. Morrell, Leyland, Lancashire, and J. Williamson, Willcross, Gisburn, Yorkshire—A new or improved method of purifying the noxious vapours or gases given off from night soil or other similar substances during the heating, drying, or evaporating of such substances.
607. E. A. Wunsch, Glasgow—Imp. in treating sea-weed, and in apparatus therefor.
610. E. W. Binney, 40, Cross-street, Manchester—An improved lamp burner. (A com.)
611. W. Clark, 53, Chancery lane—Imp. in the manufacture of sulphuric acid, and in apparatus for the same. (A com.)
612. W. Hamilton, 13, Paternoster-row—Imp. in means or apparatus for registering suitable for advertisers' purposes.
613. J. Craig, Weston-park, Shipston-on-Stour, Worcestershire—Imp. in apparatus for detecting and detaining thieves, and indicating the presence of fire.
614. W. L. Tizard, Birmingham—Imp. in manufacturing curvated armour plates and other iron work, and in machinery or apparatus employed therein.

Dated 5th March, 1863.

615. W. Whittle, Smethwick, Staffordshire—Imp. in machinery for the manufacture of nails.
616. T. Thornton, E. Thornton, and R. Thornton, Elland, Yorkshire—Imp. in machinery or apparatus for preparing wool or other fibrous substances for spinning.
617. J Clinton, 35, Percy-street, Tottenham-court-road—Imp. in the construction of flutes.
618. W. Allen, Cheadle, and W. Johnson, Newton Moor, Chester—Certain imp. in machinery or apparatus for grinding "cards" employed in carding engines.
619. R. D. Dwyer, Manchester—Certain imp. in springs to be employed in the manufacture of beds, seats, or for similar purposes where an elastic surface is required.
621. W. Wells, Ryder's-court, Leicester-square—Imp. in horseshoes and in the method of fastening the same.
623. S. H. Foster, T. Bunney, and J. Anderson, Leicester—Imp. in means or apparatus for the manufacture of looped fabrics.
624. J. Miller, Upwey, near Dorchester—Imp. in horticultural buildings and other glazed structures, part of which imp. is also applicable to ventilating other buildings.
625. E. B. Wilson, 5, Parliament-street, Westminster—An imp. or imps. in the manufacture of steel, and in the apparatus employed therein.
627. J. Howie, Hurlford, Ayr, N.B.—Imp. in the construction of the crossings of railways.
630. C. Clay, Walton-grange, Wakefield—Imp. in chain harrows.
631. J. Morris and T. Newton, 200, Upper Thames-street—An imp. or imps. in refrigerators and other like articles.
632. W. H. Buckland, Barge-yard—Imp. in the mode of and in the apparatus for producing gas for illuminating or heating purposes, parts of which imps. are also applicable for increasing the illuminating and heating power of ordinary lighting gas.

Dated 6th March, 1863.

633. M. Jourdin, Manchester—Imp. in machinery for engraving by means of electricity.
634. A. Cuthell, Skerton, Lancashire—Imp. in self-acting dampers for steam engine furnaces.
635. A. W. Makinson, Westminster—Imp. in locomotive and stationary engines.
638. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of illuminating gas, and in apparatus employed therein. (A com.)
639. D. W. Ransom, 24, Pembroke-place, Liverpool—Imp. in fixing artificial teeth.
640. T. Hancock, Birchwood, near Alfreton, Derbyshire—An improved receptacle for gold and silver or other coins.
642. T. G. Webb, Manchester—Imp. in the manufacture of articles of pressed glass.
643. A. V. Newton, 66, Chancery-lane—An improved construction of elastic carriage wheel. (A com.)
644. W. E. Newton, 66, Chancery-lane—Imp. in the construction of metal casks, and in the machinery employed in the manufacture thereof. (A com.)

Dated 9th March, 1863.

646. R. Mushet, Coleford, Gloucestershire—An imp. in the manufacture or treatment of pig or cast iron.
650. J. Haworth, Manchester—Imp. in breaks for omnibuses and other carriages.
652. W. Inglis, Edinburgh—Imp. in steam boilers and engines.
656. J. R. Gorst, Liverpool—Imp. in carriages.

Dated 11th March, 1863.

662. R. A. Brooman, 166, Fleet street—Imp. in voltaic belts and bandages. (A com.)
664. G. A. Fulton and J. Clyde, Stepney—Imp. in dry gas meters.
666. H. Wilson, Watling-street—Imp. in machinery for shaping wood.
668. A. Barclay, Kilmarnock, Ayr, N.B.—Imp. in locomotive boring and winding engines.
670. J. Werge, 379, Oxford-street—Imp. in apparatus for indicating any regulated maximum or minimum degree of temperature. (A com.)
672. J. Renshaw, Manchester—Imp. in machinery for dressing, raising, and brushing silk and cotton velvets, velveteens, cords, plushes, and other piled fabrics.

Dated 12th March, 1863.

674. F. B. Kraushaar, 2, Thavies-inn, Holborn—Imp. in apparatus for winding, cleaning, measuring, sorting, doubling, throwing, and reeling silk, parts of which imps. are also applicable to like machinery for spinning, doubling, and twisting cotton, wool, and other fibrous materials.

Invention with Complete Specification Filed.

678. E. H. Lomas, Rodney-wharf, Church-road, Battersea—Imp. in the action of charger or measure for powder flasks, canisters, or other vessels.—12th March, 1863.

Patents Sealed.

[*From Gazette, March 20th*, 1863.]

March 20th.	2617. J. Eardley.
2593. T. Knowles, J. Houghton, W. Knowles, and W. Houghton.	2618. W. Lea.
2595. W. Dobson.	2623. T. R. Harding.
2597. R. A. Brooman.	2625. J. J. Bates.
2604. R. A. Brooman.	2629. W. E. Gedge.
2614. F. Tolhausen.	2635. J. C. Pruvost-Bauchart.
2615. J. Raywood.	2643. H. Hirsch.
2616. J R. Breach and E. B. P. Smith.	2645. H. Hellis.
	2657. P. G. Van der Byl.
	2661. W. C. Cambridge.
	2663. W. H. Ward.

[*From Gazette, March 24th*, 1863.]

March 21st.	2854. J. Turnbull.
2334. S. J. Paris and W. Bate.	3101. R. Beck.
March 24th.	3157. J. Moule.
2640. W. B. Lord and F. H. Gilbart.	3366. W. Tongue.
2648. R. A. Brooman.	3478. W. Richards.
2683. J. E. Billups.	37. H. Bessemer.
2695. D. Lowe.	68. A. Guild.
2703. J. Heap.	114. H. Bessemer.
2747. T. Bouch.	151. J. Lightfoot.
2810. E. Lord.	217. W. Allen and W. Johnson.
2849. T. Greenwood.	220. M. A. F. Mennons.
	300. C.Smithies&C.L. Smithies.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, March 24th*, 1863.]

March 19th.	1041. R. Seager.
728. J. Brown.	1915. R. A. Brooman.
741. W. Turner.	*March 20th.*
742. G. Crawshay.	988. C. F. Sebille.
759. B. Cooper.	*March 21st.*
763. G. K. Snow.	761. S. C. Lister.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, March 24th*, 1863.]

March 16th.	*March 21st.*
850. A. C. L. Devaux.	680. H. Brierley.
1087. A. C. L. Devaux.	

Journal of the Society of Arts.

FRIDAY, APRIL 3, 1863.

ADDRESSES TO HER MAJESTY THE QUEEN AND HIS ROYAL HIGHNESS THE PRINCE OF WALES.

The Council hereby convene a General Meeting of the Members of the Society on Friday next, the 10th day of April, at half-past Four o'clock p.m., to vote addresses to Her Majesty the Queen and to His Royal Highness the Prince of Wales on the Marriage of His Royal Highness.

By order of the Council,
P. LE NEVE FOSTER,
Secretary.

Society's House, Adelphi, W.C.,
2nd April, 1863.

PRIZES FOR ART-WORKMANSHIP.

The following notice has been issued by order of the Council:—

I. The Council of the Society of Arts hereby offer prizes for the successful rendering of the undermentioned designs in the undermentioned processes of manufacture, according to the directions detailed in each case.

II. Such designs will be by artists of great reputation, to be translated into the various modes of workmanship, and photographs and castings of such designs will be sold by the Society, at the Society's House, at cost price to persons desiring to be competitors. The prices of the photographs are stated after each subject.

III. The works to be executed will be considered to be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

IV. The exhibitors are required to state in each case the price at which their works may be sold, or if sold previously to exhibition, at what price they would be willing to produce a copy.

V. The awards in each class will be of two grades, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the award; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

VI. Before the award of prizes is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

1. Modelling in Terra Cotta, Plaster, or Wax.

(*a.*) *The Human Figure in bas relief.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's design of the "Three Graces."* Dimensions—The figures are to be 9 inches high.

[Photograph—One shilling.]

(*b.*) *Ornament in bas relief.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas van Leyden, 1528. Dimensions, 12 inches by 6 inches.

[Photograph—Sixpence.]

2. Repousse Work in any Metal.

(*a.*) *The Human Figure as a bas-relief.*—A prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's "Three Graces."* Dimensions—The figures are to be four inches high.

[Photograph—One shilling.]

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a Flemish salver in the South Kensington Museum, date about 1670, No. 1153. Dimensions—Ten inches in diameter.

[Photograph—Two shillings.]

3. Hammered Work, in Iron, Brass, or Copper.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after an iron German arabesque, about 1520, in the South Kensington Museum, No. 2450. Dimensions—12 inches by 1½ inch.

[Photograph—One shilling and threepence.]

4. Carving in Ivory.

The Human Figure in bas relief.—One prize of £10 for the best and a second prize of £5 for the next best, work executed after a Terra Cotta ascribed to Luca della Robbia, about 1420, in the South Kensington Museum, No. 7610. Dimensions—The plaque to be four inches high.

[Photograph—One shilling.]

5. Chasing in Metal.

(*a.*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after a reduced copy of Gibson's Psyche. A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society, price, 12s.

A plaster cast may be obtained from D. Brucciani, 39, Russell-street, Covent-garden, W.C. Price, 3s. 6d.

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a bronze plaque in the South Kensington Museum, No. 1217. A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society, price 1s.

6. Enamel Painting on Metal, Copper, or Gold.

(*a.*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's design of the "Three Graces,"* executed in *grisaille.* Dimensions—The figures are to be four inches high.

[Photograph—One shilling.]

(*b.*) *Ornament in grisaille.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a German arabesque, 16th century. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

7. Painting on Porcelain.

(*a*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's "Boy bearing Doves,"* in the cartoon of the *"Beautiful Gate."* Dimensions, the same as the Photograph. The work is to be coloured according to the taste of the painter.

[Photograph—Ninepence.]

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, 1528, and coloured

according to the taste of the painter. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

8. Inlays in Wood (Marquetry, or Buhl), Ivory or Metal.

(*b*). *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a majolica plate in the South Kensington Museum, 1490, No. 1671. Dimensions—The same as the Photograph.

[Photograph,—One shilling and threepence.]

9. Engraving on Glass.

(*b*.) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, 1528, engraved the height of the photograph; and if round a glass or goblet, repeated so as to be not less than 9 inches long when stretched out.

[Photograph—Sixpence.]

10. Embroidery.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a German example in the Green Vaults at Dresden. Dimensions, according to the taste of the embroiderer.

[Photograph—Sixpence.]

The Council cannot hold itself responsible for any accidents or damages of any kind, occurring at any time.

VII. Persons intending to compete should give notice, in their own names or by cypher, to the Secretary of the Society of Arts, John-street, Adelphi, W.C., on or before the 15th July, 1863.

VIII. Each work must be marked with the name of the Art-workman, or, if preferred, with a cypher, accompanied by a sealed envelope, giving the name and address of the Art-workman, and delivered free of all charges, on or before the 31st August, 1863, at the Society of Arts' House, John-street, Adelphi, London, W.C.

By Order,
P. LE NEVE FOSTER, *Secretary.*

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary.*

The subscription of each member is limited to one guinea.

The Subscription List is still open, but is omitted this week for want of space. It will be republished shortly.

EXAMINATIONS, 1863.—LOCAL EDUCATIONAL BOARDS.

The following is the List of Local Boards for the present year:—

*** The Boards marked thus have been formed this year.

Local Board for Aberdeen.

Mr. H. Ambrose Smith, Actuary, Aberdeen, *Chairman.*
John Cruickshank, LL.D., late Prof. of Mathematics, Marischal College.
James S. Brazier, Professor of Chemistry, Aberdeen University.
Thos. Davidson, A.M., Rector of the Grammar School, Old Aberdeen.
Robert Beveridge, M.D., Lecturer on Botany and Physiology, Aberdeen.
Mr. William Rattray, Teacher, Free South Church School, Aberdeen.
,, David Maver, Teacher, Free Bon-Accord School, Aberdeen.
,, Peter Cleland, Teacher, School of Art, Aberdeen.
,, William Brebner, Manager (E. L. Co.), Flour Mill, Brae, Aberdeen.

The above constitute the *working* Local Board, in addition to whom, the following gentlemen, being connected with local institutions for adult evening instruction, are also *ex-officio* members of the Board:—

The Lord Provost of Aberdeen.
The Senior Baillie of Aberdeen.
The Dean of Guild, Aberdeen.
David Thomson, M.A., Professor of Natural Philosophy, University of Aberdeen.
Baillie McHardy.
Rev. J. Longmuir, LL.D., 15E, North-street, Aberdeen.
Alexander Kilgour, M.D., Union-street, Aberdeen.
Mr. John Duguid Milne, Advocate, Aberdeen.
,, James Westland, Banker, 1, King-street, Aberdeen.
,, John Miller, Manufacturer, Sandilands Chemical Works, Aberdeen.
,, Hardy Robinson, Manufacturer, Aberdeen.
,, William Ramage, Architect, Union-street, Aberdeen.
,, Th. Melville, Iron Merchant, Gallowgate, Aberdeen.
,, William Fraser, Surgeon, Union-terrace, Aberdeen.
,, James Berry, Manufacturer, Queen-street, Aberdeen.
,, Alexander D. Milne, Bleacher (Richards and Co.), Rubislaw, Aberdeen.
,, John Bulloch, Brassfounder, Wellington-road, Aberdeen.
,, John Gray, Engineer (McKinnon and Co.), Aberdeen.
,, Robert Leys, Engineer, 76, Park-street, Aberdeen.
,, James Sinclair, Mechanics' Institution. Aberdeen, *Secretary.*

Local Board for the Airdrie School of Arts and Mechanics' Institution.

Rev. James McGown, *President.*
,, B. C. Brown.
,, Wm. Jackson, A.M.
,, R. W. Lawson.
,, Matthew McGavin, M.A.
,, Duncan McNab.
Mr. Thomas Torrance, surgeon, Airdrie.
,, James Paterson, surgeon, Airdrie.
,, John Dalziel, banker, Airdrie.
,, James Boswell, teacher, Airdrie.
,, Andrew Aitken, ironmonger, Airdrie.
,, James Forrester, merchant, Airdrie.
,, John MacArthur, teacher, New Monkland.
,, Telford Martin, engineer, Airdrie.
,, Robert Stevenson, engineer, Airdrie.
,, John Shaw, draper, Airdrie.

Mr. John C. Waddell, solicitor, Airdrie.
,, Thomas Watson, cabinet maker, Airdrie.
,, William Baird, architect, Airdrie.
,, Boyd M. McCrae, gas manager, Airdrie, *Secretary.*

Local Board for the Aldershot and Farnham District.

Capt. Charles Edward Mangles, Banker, and Chairman of the Royal Mail Steam Company, and of the London and South Western Railway Company, *Chairman.*
Mr. R. O. Clarke, Surgeon, Farnham.
Rev. James Dennett, Incumbent, Aldershot.
Mr. Donald Mangles Dewar, Manager of the West Surrey Bank, Aldershot.
,, Frederick Eggar, Architect and Surveyor, Aldershot.
,, Thomas Fabian, Clerk of Works, Royal Engineer Department, Camp, Aldershot.
,, John Grant, Superintendent of Military Schools, Aldershot.
,, William Ker, Clerk of Works, Royal Engineer Department, Camp, Aldershot, and Representative of the Aldershot Institution.
Capt. George Newcome, Justice of the Peace, Aldershot.
Mr. Ben. Nichols, Solicitor, Farnham.
,, H. Poppleton, L.C.P., Private Schoolmaster, Farnham.
Capt. Ross, Dep.-Assist.-Quartermaster-Gen., Aldershot.
Rev. Dr. Rule, Wesleyan Chaplain, Aldershot.
Mr. John Seymour, Assistant Manager of the Bank, Odiham, Hants, and Representative of the Mechanics' Institution, Odiham.
Dr. John Shoolbraid, M.D., Surgeon, Aldershot.
Mr. Sloman, Surgeon, Farnham.
,, Charles Stroud, Head Master of the Grammar School, Farnham, and Representative of the Young Men's Association, Farnham.
The Ven. Archdeacon Utterton, Farnham.
Mr. Thomas White, Outfitter, Aldershot.
,, William Hollest, Solicitor, Farnham, *Treasurer.*
,, Barrow Rule, M.C.P., Principal of the Classical and Mathematical School, Aldershot, *Hon. Secretary.*

Local Board for Ashford.

Mr. R. C. Mansell, Superintendent of the Carriage Department, Ashford New Town Railway Works.
Rev. J. P. Alcock, Vicar of Ashford.
,, R. H. Wright, M.A., Grammar School, Ashford.
Mr. J. J. Cudworth, Superintendent of Locomotive Department, S.E. Railway Works, Ashford New Town.
,, T. H. Vie, Schoolmaster, Barrow-hill, Ashford.
,, J. Keener, Accountant, South Eastern Railway Works, Ashford New Town.
,, R. Rabson, Draper, Church Gates, Ashford.
,, F. Garaway, Schoolmaster, Ashford New Town, *Secretary.*

Local Board for Bacup.

Mr. Thomas Aitken, Manufacturer, Holmes, Bacup, *Chairman.*
,, Henry Maden, Cotton Spinner, Rockliffe House, Bacup.
,, J. H. Worrall, M.R.C.S. Eng., Wheatley Cottage, Bacup.
,, John Aitken, J.P., Cotton Spinner, Lane-end, Bacup.
,, John Howorth, J.P., Cotton Spinner, Hempsteads, Bacup.
,, Sam Hall, Solicitor, Forest House, Bacup.
,, G. C. Harrison, Cotton Spinner, Forest House, Bacup.
,, John Harris, Revenue Officer, Willow Cottage, Bacup.
,, James Greaves, Sizer, South-street, Bacup.
,, Thomas Newbigging, Gas Engineer, Bacup, *Hon. Secretary.*

*** Local Board for the Banbridge (Ireland) Literary and Mutual Improvement Society.

Mr. William Waugh, J.P., Banbridge, *Chairman.*
,, Robert McClelland, Linen Manufacturer, Bellmount, Banbridge, *Vice-Chairman.*
,, John Welsh McMaster, J.P., Gilford.
,, Denis Leonard, Solicitor, Banbridge.
,, John Hawthorn, M.D., Banbridge.
,, John Smith, jun., C.E., Milltown, Banbridge.
,, George Barry, Local Railway Manager, Banbridge.
,, Alexander Black, Hon. Sec., Literary and Mutual Improvement Society, Banbridge (County Down), Ireland, *Secretary.*

Local Board for Banbury.

Rev. Henry Back, Vicar, *Chairman.*
Mr. T. W. Barrows, Engineer.
,, Thomas Beesley, F.C.S.
,, William Johnson, F.R.A.S.
,, J. E. Kirby, Engineer.
,, D. Pidgeon, Engineer.
,, R. H. Rolls, Solicitor.
,, A. B. Rye, F.R.C.S.
,, James Stockton, Solicitor.
,, John H. Beale, Banbury, *Secretary.*

Local Board for Barnet.

Rev. Frederick C. Cass, M.A., Hadley Rectory, N., *Chairman.*
,, Thomas R. White, M.A., Finchley Rectory, N.
,, John D. Bell, Brunswick-house, Barnet, N.
Mr. Charles T. Carter (President of Institute), Hadley, N.
,, Frank Milne, Hadley, N.
,, Stephen J. Baldock (Vice Pres. of Inst.), Barnet, N.
,, John Thimbleby, Barnet, N., *Secretary.*

Local Board for Belfast.

Mr. Joseph John Murphy, 13, College-square East, Belfast, *Chairman.*
,, Thomas M'Clinton, 81, Donegall-street, Belfast.
Rev. John Scott Porter, 16, College-square East, Belfast.
Mr. Robert Patterson, 6, College-square North, Belfast.
Rev. Isaac Nelson, Sugarfield, Shankhill-road, Belfast.
Mr. Thomas Morrison.
,, Charles Rainey, 118, Joy-street, Belfast.
,, F. A. Maitland, *Librarian.*
Rev. William C. M'Cullagh, Ballysillan, Belfast, *Secretary.*

Local Board for Birmingham and Midland Institute.

William Scholefield, Esq., M.P., Minories, Birmingham, *Chairman.*
Mr. John Jaffray, Newspaper Proprietor, New-street, Birmingham.
,, Henry Wiggin, Refiner, Metchley Grange, Harborne, near Birmingham.
,, Robert Wright, Accountant, Temple-row West, Birmingham.
The Rev. Charles Evans, M.A., Head Master of King Edward's School, Birmingham.
,, Chancellor Law, Warden of Queen's College, Birmingham.
Rt. Hon. C. B. Adderley, M.P.
Charles Sturge, Esq., Broad-street, Mayor of Birmingham.
Mr. Alderman Lloyd, Banker, High-street, Birmingham.
,, ,, Manton, Jeweller, Great Charles-street, Birmingham.
,, Councillor Holliday, Draper, New-street, Birmingham.
,, Councillor Brooke Smith, Manufacturer, Hill-street, Birmingham.
,, W. C. Aitken, Clerk of Works, Cambridge-street Works, Birmingham.

Mr. Joseph Chamberlain, Manufacturer, Broad-street, Birmingham.
,, John B. Gausby, Merchant, George-street, Parade, Birmingham.
,, John D. Goodman, Merchant, Minories, Birmingham.
The Rev. T. N. Hutchinson, M.A., New-street, Birmingham.
Mr. John S. Hopkins, Manufacturer, 56, Calthorpe-street, Edgbaston, Birmingham.
,, William Mathews, jun., M.A., Estate Agent and Surveyor, Edgbaston House, Birmingham.
Charles E. Mathews, Solicitor, Waterloo-street, Birmingham.
,, Walter May, Engineer, Berkeley-street, Birmingham.
,, Arthur Ryland, Solicitor, Cannon-street, Birmingham.
,, Alfred Cresswell, Builder, Five Ways, Birmingham.
,, Howard S. Pearson, Stationer, Swan-passage, Birmingham.
,, Thomas Martineau, Solicitor, Cannon-street, Birmingham, *Hon. Secretary*.

Local Board for Bishops' Stortford.

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Mr. Joseph Bell, M.A., Head Master, Collegiate School, Bishops' Stortford.
Rev. William J. Copeland, B.D., Rector of Farnham, Essex.
Mr. E. M. Dillon, M.A., Collegiate School, Bishops' Stortford.
Rev. Godfrey Goodman, Head Master, High School, ditto.
,, John Menet, M.A., Chaplain, Diocesan Training School, Hockerill.
Mr. G. Augustus Starling, M.D., L.R.C.P., Windhill, Bishops' Stortford.
,, F. Woodham Nash, B.A., Sion House, Birchanger, Bishops' Stortford, *Secretary*.

Local Board for Blackburn.

Mr. Ellis Duckworth, Builder, St. Peter's-place, Blackburn, *Chairman*.
,, James Booth, Chemist and Druggist, Richmond-terrace, Blackburn, *Vice-Chairman*.
,, John Brandwood, Cotton Manufacturer, Montague-street, Blackburn.
,, James Cavis, Weaver, Hannah-street, Blackburn.
,, Robert Davies, Engineer, George-street West, Blackburn.
,, Robert Hopwood Hutchinson, Cotton Spinner and Manufacturer, Highfield, Blackburn.
,, Thomas Hand, Book-keeper, Nova Scotia.
,, Thomas Kenyon, Weaver, New Park-street, Blackburn.
,, Daniel Leach, Book-keeper, Moss-street, Blackburn.
,, George William Prebble, Montague-street, Blackburn.
,, John Robinson, Dugdale-street, Blackburn.
,, John Seed, Mechanic, Cunningham-place, Blackburn.
,, William Gourlay, Editor of the *Blackburn Standard* and *Patriot* Newspapers, } *Hon. Secretaries.*
,, John H. Margerison, Book-keeper, Blackburn. }

Local Board for Blandford.

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,, Edward Fisher, Draper, Market-place, Blandford.
,, Wellington E. Groves, Pharmaceutical Chemist, Market-place, Blandford.
,, James B. Green, Architect and Surveyor, Salisbury-street, Blandford, *Secretary*.

Local Board for Bradford.

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,, J. R. Campbell, D.D., Independent Minister, Great Horton-road.
Mr. Thos. Clark, Bank Clerk, Trafalgar-street.
Mr. Lee Clough, Bank Clerk, Southfield-square.
Rev. H. B. Creak, M.A., Professor of Philosophy and Mathematics, Airedale College.
Rev. Daniel Fraser, LL.D., President of Airedale College.
,, S. G. Green, B.A., Classical Tutor, Rawden College.
Mr. James Hanson, Proprietor of the *Bradford Review*, Great Horton-road.
,, Jonas Hey, Woolsorter, 1, Edward-street.
,, J. M. Jaques, Warehouseman, 5, Manor-row.
,, James Law, Stuff Merchant, Claremont.
,, Charles Lund, Accountant, &c., Darley-street.
,, J. T. Newboult, Borough Rate Collector.
,, A. Smith, Warehouseman, 1, Sawrey-place.
,, S. Smith, Woolsorter, Bedford-street.
,, Alex. Walker, Woolsorter, Little Horton-lane.
,, D. J. Crebbin, Schoolmaster, Chapel-street, Bradford, *Secretary*.

Sussex (Brighton) Local Board.

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Mr. Howard Elphinstone, M.A., Hastings.
Rev. John Griffith, M.A., Brighton College.
Dr. Jardine, LL.D., Brighton.
Rev. J. D. Mozley, B.D., Vicar of Old Shoreham.
Dr. H. S. Turrell, M.A., Brighton.
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Charles Beard, M.D., Cantab: Brighton.
William King, M.D., Cantab: Brighton.
Mr. John Andrews, Brighton.
,, W. R. Barrymore, Brighton.
,, Thomas Barnes, M.A., Brighton.
,, Thomas Barton, Brighton.
,, S. Bastick, Brighton.
,, A. Bigge, Stipendiary, Brighton.
,, John Cordy Burrows, J.P., Brighton.
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,, Henry Catt, Brighton.
,, George Cobb, Brighton.
,, Alfred Cobbett, Brighton.
,, Alfred Cox, Brighton.
,, T. H. Cross, B.A., Brighton.
,, Samuel Evershed, Brighton.
,, Thomas Page, Brighton.
,, W. H. Harper, Shoreham.
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,, Alfred Martin, Brighton.
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,, John Peto, F.R.A.S., Brighton.
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,, Prideaux S. Rickards, Brighton.
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Rev. T. Bowman, M.A., Seymour-villa, Clifton.
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Mr. F. N. Budd, M.A., 5, Harley-place, Clifton.
Rev. J. Burder, M.A., South Parade, Clifton.
Mr. I. A. Cooke, Windsor-terrace, Clifton.
„ J. D. Corfe, 31, Richmond-terrace, Clifton.
Earl of Ducie, Tortworth court, Gloucestershire.
Mr. P. H. Edlin, Lennox-villa, Clifton.
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Sir A. H. Elton, Bart., Clevedon Court, near Bristol.
Mr. J. S. Fry, Cotham New-road, Bristol.
Rev. Professor Gotch, Baptist College, Stokes Croft, Bristol.
Mr. F. W. Griffin, Ph.D., School of Chemistry, Kingsdown-parade, Bristol.
„ J. S. Harford, F.S.A., Blaize Castle, Henbury, near Bristol.
Rev. N. Haycroft, M.A., Portland-square, Bristol.
Mr. F. Hazledine, B.A., Meridian-villa, Clifton.
„ M. D. Hill (H.M. Commissioner in Bankruptcy for Bristol District), Heath House, Stapleton, near Bristol.
„ C. T. Hudson, M.A., Principal of New College, Bristol.
„ W. H. G. Langton, M.P., Clifton Court, Clifton.
„ D. Mackie, M.R.S.A., Queen's-square, Bristol.
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Rev. Precentor Poole, M.A., Cornwallis-crescent, Clifton.
„ James Robertson, A.M., 1, Apsley-place, Durdham Down, Bristol.
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Mr. William Johnson, Eton College.
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S. L. Rymer, Esq., dentist, North-end.
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Mr. Joseph Whitwell Pease, J.P., Woodlands, Darlington, *Chairman.*
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Mr. David Dale, West Lodge, Darlington.
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Mr. Fras. Mewburn, jun., Solicitor, Larchfield, Darlington.
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Mr. Wm. Salkeld, C.E., Albion-street, Darlington.
,, Henry Fell Pease, Pierremont, Darlington.
,, William Clapham, Grange-road, Darlington.
,, Robert Mackay, Northgate, ditto.
,, Francis T. Steavenson, Solicitor, Bondgate, ditto.
,, Geo. S. Gibbs, Haughton-le-Skerne, Darlington, *Secretary.*

Local Board of Deptford.

Rev. C. F. S. Money, M.A., Incumbent of St. John's, Deptford, St. John's Parsonage, Deptford, *Chairman.*
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,, W. G. Lacey, D.D., Head Master of Grammar School, the Grammar School, Lewisham.
Mr. W. Keiser, M.A., Principal of Academy, Percival House, Blackheath.
,, H. E. Montgomerie, F.S.A., Merchant, Ashley House, Wickham-terrace, Deptford.
,, James West, Head Master of St. John's Schools, Deptford.
,, Thomas Earland, Master of Educational Classes, R. Division Metropolitan Police, 2, Wellington-grove, Greenwich-road, S.E., *Secretary.*

Local Board for Derby.

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Mr. A. Butel, Friar Gate.
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,, J. Gadsby, Tenant-street.
Dr. H. Goode, St. Mary's Gate.
Mr. F. M. Haywood, Vernon-street.
,, A. J. Henley, Friar Gate.
,, A. E. Holmes, Alvaston.
,, J. Hudson, Osmaston-road.
,, M. Kirtley, Burton-road.
Rev. T. H. Leary, Grammar School.
Mr. John Ives, Mumby.
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,, J. A. Warwick, Railway-terrace.
Rev. J. Walker, Wilmot-street.
,, W. F. Wilkinson, Ashbourn-road.
Mr. William Woodward, St. Alkmund's Churchyard.
,, Newton Greaves, Wardwick.
,, Charles Holmes, London-road.
,, H. M. Holmes, Hon. Local Sec. to the Society of Arts, London-road, Derby, *Secretary.*

Local Board for Devonport.

Mr. R. J. Laity, J.P., Surgeon, Mayor of Devonport, Ker-street, Devonport, *Chairman.*
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,, R. C. Rogers, Secretary to the Captain Superintendent, Royal William Victualling Yard, Stonehouse .... } Vice-Presidents of the Institute.
,, U. H. King, Quartermaster R.M.L.I., Emma-place, Stonehouse .... }
,, P. W. Swain, Surgeon, Councillor of the Borough, Park-place, Stoke .... }
,, R. Oram, Emma-place, Stone-house .... }
Rev. Æ. B. Hutchison, Incumbent of St. James's the Great, Clarence-cottages, Morice-town.
,, G. Knowling, Incumbent of St. Paul's, Durnford-street, Stonehouse.
,, J. Lampen, Incumbent of St. John the Baptist, Home-park, Stoke.
,, J. Stock, Baptist Minister, Milne-place, The Park, Morice-town.
Mr. E. St. Aubyn, junior, Steward of the Manor, Nelson-terrace, Stoke.
Capt. G. Biddlecombe, R.N., Master-Attendant, H.M. Dockyard, Keyham.
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Mons. P. Delarue, Teacher of the French Language, Ker-street, Devonport.
Mr. W. Hannaford, Teacher of Music, Organist in the Chapel in H.M. Dockyard, Fellowes-place, Stoke.
T. Miller, Esq., South-hill, Stoke.
Mr. I. C. Radford, Chemist, Alderman of the Borough, Fore-street, Devonport.
,, R. H. Rae, Master of School in H.M. Dockyard, Keppel-place, Stoke.
,, G. H. E. Rundle, Solicitor, Clerk of the Peace, Argaum-villas, Stoke.
,, R. P. Saunders, Master Shipwright's Assistant, H.M. Dockyard, Keyham.
J. H. Shapton, Esq., Higher Portland-place, Stoke.
Mr. W. P. Swain, Surgeon, Councillor of the Borough, Ker-street, Devonport.
,, L. P. Tripe, Surgeon, St. Aubyn-street, Devonport.
,, T. Woollcombe, Solicitor, Chairman of South-Devon Railway Company, Town-Clerk, Ker-street, Devonport.
,, W. Mogg, Mechanics' Institute, Devonport } *Hon. Secretaries.*
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_ Local Board for Farsley (near Leeds) Mechanics' Institution (Yorkshire Union).

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,, Stephen Roberts, Clothier, Farsley.
,, Edward Keighley, Clothier, Farsley.
,, Joseph R. Hainsworth, Cloth Manufacturer, Farsley.
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Benjamin Dickson, Esq., Landed Proprietor, Flax Spinner, Linen and Linen-thread Manufacturer, Gilford, County Down, Ireland.
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,, A. H. Dick, M.A., Free Church Training College.
,, James McIntosh, Shipowner, 6 Carlton-place.
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,, D. Bass, Ashburnham-grove.
,, W. S. Browning, South-street.
,, Newton Crosland, Hyde-vale.
,, H. Divers, Conduit-vale.
,, E. J. Reed, M.I.N.A., 10, Glenmore-terrace.
,, J. Swift, Conduit-vale.
,, James Spencer, 3, Wintown-place, Greenwich, S.E., *Secretary.*

Local Board for Halifax Mechanics' Institution.

Dr. Garlick, Lord-street, Halifax, *Chairman.*
Rev. R. L. Carpenter, B.A., Milton-place.
Mr. William Corke, schoolmaster, Hampden-place.
,, J. D. Hutchinson, newspaper editor.
,, Benjamin Musgrave, book-keeper, Clarendon place.
,, A. C. Foster, solicitor, 1, Westgate, Halifax, *Secretary.*

Local Board for Halifax Working Men's College.

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H. Akroyd Ridgway, Esq., B.A., Bank-field, Halifax.
J. W. Garlick, Esq., M.D., Lord-street, Halifax.
Mr. L. H. Child, The Shed, Haley-hill, Halifax.
,, J. Barrowby, The School, Booth-town, Halifax.
,, Thos. Midgeley, Bowling-dyke, Halifax.
Mr. Thos. Cordingley, Contractor, Ringby, near Halifax.
,, Edwin Taylor, Decorative Painter, Horton-street, Halifax.
,, S. Hartley, Bowling-dyke, Halifax.
,, Jonathan Wainhouse, Accountant, Cross-hills, Halifax.
,, Middlebrook, Accountant, Cross-hills, Halifax.
,, W. Longbottom, Warehouseman, Cross-hills, Halifax.
,, G. L. Parker, Accountant, Cross-hills, Halifax.
,, Geo. Gibb, 41, Haley-hill, Halifax, *Secretary.*

Local Board for West Hartlepool.

Mr. William Wilkinson Brunton, Solicitor, West Hartlepool, *Chairman.*
,, Riton Oldham, Surgeon, West Hartlepool.
,, James Irvine Carson, Engineer, Norton.
,, Thomas Casebourne, C.E., West Hartlepool.
,, Jonathan Salmon, Slate Merchant, West Hartlepool.
,, Jasper Barugh, Bank Manager, Hartlepool.
,, William Horner, Bank Manager, West Hartlepool.
,, Charles Townshend Casebourne, Engineer, West Hartlepool.
,, Robinson Murray, Engineer, West Hartlepool.
,, Thomas Preston Brunton, Solicitor, West Hartlepool, } *Secretaries.*
,, John Thomas Belk, Solicitor, West Hartlepool, }

Local Board for Hertford.

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The Hon. Henry Cowper, Panshanger, Hertford.
Mr. Young Crawley, Hertford
Rev. C. Deedes, B.A., Vicar of Bengeo, Herts.
Mr. Robert Dimsdale, Essendon-place, Herts.
,, Samuel Henry Errington, Hertford.
,, John Lyon Foster, Hertford.
,, Henry Gilbertson, Hertford.
,, John William Grove, Hertford.
,, George Hancock, Hertford.
,, James Thomas Hannum, Hertford.
Rev. Nathaniel Keymer, M.A., Head Master of Christ's Hospital, Hertford.
,, Thomas Lander, B.A., Hertingfordbury, Herts.
,, Thomas L. Lingham, B.A., Hertingfordbury, Herts.
Mr. Daniel Peirson, Hertford.
,, Henry Robins, Hertford.
Rev. Henry Smith Warleigh, Rector of St. Andrew's, Hertford.
Mr. John Marchant, Jun., Port Vale, Hertford, and Rev. Edward Bartrum, M.A., Head Master of Hale's Grammar School, Hertford, *Honorary Secretaries.*

Local Board for Hitchin.

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Mr. William Dawson, Bancroft, Hitchin.
,, David Lloyd, Bancroft.
,, Francis Lucas, Tilehouse-street, Hitchin.
,, Frederick Seebohm, Bancroft.
Rev. George Short, Tilehouse-street, Hitchin.
Mr. John Sugars, Grammar School, Hitchin.
,, J. H. Tuke, Bancroft.
,, Joseph Pollard, Highdown, near Hitchin, *Secretary.*

Local Board for Holmfirth.

Mr. John Hixon, Springfield-terrace, *Chairman.*
,, Thomas J. Brook, Registrar, High Town.
,, Henry Brooks, Schoolmaster, Mount-pleasant.
,, John Harpin, J.P., Birk's-house, Holmfirth.
,, Joshua Moorhouse, J.P., North-terrace.
,, Jas. Boothroyd, Springfield-terrace.
,, J. T. Taylor, Eldon House.
,, J. Batley, South-lane, Holmfirth, *Secretary.*

*** Local Board for Idle, near Leeds (Yorkshire Union).

Rev. Samuel Dyson, Idle, *Chairman.*
Mr. William Clarke, Idle.
,, James Hall, Idle, *Secretary.*

Local Board for Ingrow-cum-Hainworth.

Rev. W. C. Mayne, *Chairman.*
Mr. Abraham Ambler.
,, John Butterfield.
,, James Haggas.
,, David Whiteoak.
,, Jackson, Ingrow-cum-Hainworth, Keighley, *Secretary.*

Local Board for Ipswich.

T. S. Gowing, Esq., Mount-cottage, Ipswich, *Chairman.*
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,, F. H. Maude, Church-street, St. Clements.
,, T. M. Morris, Falcon-street.
Mr. J. E. Champness, Fonnereau-road.
Dr. E. Christian, Fonnereau-road.
Mr. E. Monson, Friar's-street.
Dr. Drummond, Silent-street.
Mr. John Evans, St. Matthew's Schools, Ipswich.
,, Charles Sulley, London-road.
,, Charles Silburn, 151, Friar's-road.
,, Henry Footman, Brook-street.
,, John Ridley, junior, Cornhill.
,, T. P. Howe, Wherstead-road.
,, Alf. Lambert, Berner's-street.
,, C. F. Gower, Wherstead-road.
,, Robert Everett, Rushmere, near Ipswich.
,, Edwin Barrett, 31, Cornhill. } *Secs.*
,, Herbert Wright, 44, Handford-road, Ipswich, } *Secs.*

Local Board for the East Lancashire Union of Mechanics' Institutes (Burnley).

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Mr. J Binns, Institute, Haslingden.
,, J. S. Booth, Church of England Literary Institute, Padiham.
,, T. Newbigging, Mechanics' Institution, Bacup.
,, J. Rawsthorn, Institute, Haslingden.
,, B. W. Briggs, Church of England Literary Institute, Burnley.
,, F. N. Haywood, Mechanics' Inst., Accrington.
Capt. John Dugdale, ,, ,, Habergham.
Mr. W. F. Ecroyd, ,, ,, Nelson-in-Marsden.
,, Cunliffe ,, ,, Accrington.
,, J. Howarth ,, ,, Baxenden.
,, R. Howarth, Literary ,, Crawshaw Booth.
,, John Pollard, Mechanics' ,, Sabden.
,, R. Rogerson, ,, ,, Brooksbottom.
,, J. H. Scott, ,, ,, Burnley.
,, W. Robinson, J.P. ,, ,,
,, J. Waddington, Mech. I. ,, Nelson-in-Marsden.
,, J. B. Whitehead, ,, ,, Rawtenstall.
,, Robt. Whitaker ,, ,, Newchurch.
,, T. T. Wilkinson, F.R.A.S. ,, Burnley.
,, John Sutherland, Post Office, Burnley, *Secretary.*

Local Board for the West Riding of Yorkshire (Leeds).

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,, Geo. S. Beecroft, M.P.
Rev. Canon Atlay, D.D., Vicar of Leeds.
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Mr. John Hope Shaw, } Leeds Philosophical and Literary Society.
,, P. O'Callaghan, } Leeds Philosophical and Literary Society.
Mr. Thomas Dawson, } Leeds' Mechanics' Institution.
,, Samuel Hick, } Leeds' Mechanics' Institution.
Rev. C. H. Collier, } Leeds Church Institute.
Mr. George Young, } Leeds Church Institute.
,, James Hole, } Yorkshire Union of Mechanics' Institutes.
,, James Kitson, jun., } Yorkshire Union of Mechanics' Institutes.
,, Jabez Woolley, Holbeck Mechanics' Institution.
,, Alderman Blackburn, Hunslet Mechanics' Institution.
,, Alderman Kitson, ex-Mayor of Leeds.
Rev. J. H. F. Kendall, Holbeck.
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,, T. P. Teale, jun., Leeds.
Rev. G. W. Conder, Leeds.
,, Thos. Hincks, Leeds.
Mr. Wm. Barnes, Farnley Iron Works.
,, William Beckett Denison, Leeds, *Treasurer.*
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,, E. R. Conder, M.A., Newton-grove, Leeds.
,, W. B. Pope, Victoria-place, Leeds.
Mr. J. Braithwaite. M.D., Woodhouse-square, Leeds.
,, E. Duis, Ph.D., Upper Fountain-street, Leeds.
,, J. Hammond, LL.B., Chapeltown, near Leeds.
,, J. M. Raby, B.A., Woodhouse-Grove. near Leeds.
,, W. H. Tetley, Rawdon College, near Leeds.
,, J. H. Hall, Park-lane, Leeds.
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Mr. J. K. Dall, B.A., 9, East Parade, Leeds, *Hon. Secretary* to the Board.

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,, W. Barber.
,, T. Jones.
,, J. O. Picton.
Mr. W. H. Marris.
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,, J. Sarson.

Local Board for Lichfield.

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,, William Browne, Surgeon, The Friary, Lichfield.
Rev. R. M. Grier, B.A., Lichfield, *Secretary.*

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Donald Cameron, LL.D., 22, Oxford-street.
Mr. Astrup Cariss, Secretary of the Liverpool Institute.

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Alderman Samuel Holme, 10, Benson-street.
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Dr. William Ihne, Carlton-terrace, Upper Parliament-street.
Mr. James R. Jeffery, 43, Church-street.
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M. Vittoz, Collegiate Institution.
Rev. A. Hume, D.C.L. and LL.D., 24, Clarence-street, Everton, *Secretary.*

Local Board for Lockwood.

Bentley Shaw, Esq., J.P., Woodfield-house, Lockwood, *Chairman.*
Rev. John Barker, View-place, Lockwood.
,, T. B. Bensted, M.A., Parsonage, Lockwood.
Mr. James Bierley, Lockwood.
,, Charles Kaye, Lockwood.
,, J. W. Spedding, Schoolmaster, Lockwood.
,, Alfred Lee, Mechanics' Institution, Lockwood, *Secretary.*

Local Board for the City of London College, Leadenhall-sereet, E.C.

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,, E. G. Clarke, 38, Moorgate-street, E.C.
,, D. Elder, Houndsditch, E.C.
,, F. Reynolds, Privy Council Office, Downing-street, S.W.
,, G. Warington, Apothecaries' Hall, E.C.
,, Thomas Whittington, 2, Dean-street, Finsbury, E.C.
Dr. Wood, Sussex Hall, Leadenhall-street, E.C.
Mr. Joseph Roskilly, Sussex Hall, Leadenhall-street, E.C.
,, H. W. Hansen, Sussex Hall, Leadenhall-street, E.C.' *Secretary.*

Local Board for London Mechanics' Institution.

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Rev. C. H. Boutell, M.A., Anerley-park, Norwood.
Mr. S. Vallentine, 60, Wyche-street, W.C.
,, James Gowland, 52, London-wall, E.C.
,, T. A. Reed, 41, Chancery-lane, W.C., *Secretary.*

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Mr. Frederick Gaussen, 27, Chester-square.
,, C. C. Chapman, 25, Alfred-place, West Brompton.
,, Longbottom, 14, Sussex-place, Kensington.
,, J. P. Bidlake, Priory School, Islington.
,, F. Reynolds, Sussex Hall.
,, Marshall Carpenter, 9, St. Ann's-road, Royal Crescent, Notting-hill.
Rev. J. W. Laughlin, A.M., 13, Hatton garden.
Mr. J. H. Pepper, F.C.S., A. Inst., C.E., Polytechnic Institution.
,, Thomas Brodribb, Victoria-terrace, Notting-hill.
,, James Cousens, Polytechnic Institution, Regent-street, W., *Secretary.*

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,, Henry Bragg, Builder, Vincent-square, Westminster, S.W.
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Rev. P. Leonini, D.D., 34, Vincent-square, Westminster, S.W.
,, E. G. Hancock, M.A., Curate of St. Stephen's, Westminster.
Mr. John F. J. Cuttance, St. Stephen's School, Westminster, S.W.
,, W. F. Tripp, 24, Rochester-row, S.W.
,, R. H. Bishop, Palmer's School, Westminster, S.W.
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Mr. Julian Hill, 62, Threadneedle-street.
,, C. Gordon, Goswell-street.
,, W. Cutler, Goswell-road.
,, H. Smith, St. Thomas, Charterhouse, Schools.
,, G. Phillipson, St. Thomas, Charterhouse, Schools.
Rev. R. Holme, M.A., 7, Charterhouse-square, *Hon. Sec.*

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,, R. Gregory.
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*** Local Board for Hackney (Metropolitan Association).

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,, R. G. Clements.
,, W. A. Curr.
,, J. G. Martin.
,, J. Saunders.
,, W. Slater.
,, H. Gray, Working Mens' Institute, Triangle, Hackney, *Secretary.*

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,, P. Jenns.

Mr. T. Patrick.
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,, A. B. Suter.
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,, T. Whittington.
,, T. King.
,, Jones.
,, J. Northey.
,, C. J. Crump.
,, T. N. Day, *Secretary.*

Local Board for Louth.

Mr. William Thomas Kime, J.P., Barrister-at-Law, Louth, *Chairman.*
,, Alexander Tallents Rogers, the Priory, Louth.
,, George Dixon, Mus. Doc. Oxon, Louth.
,, John Bogg, M.R C.S., and L.A.S., Louth.
,, Thomas W. Bogg, M.R.C.S., and L.A.S., Louth.
Rev. Wm. Orton, Baptist Minister, Louth.
Mr. Hay Sharpley, Merchant, Louth.
,, Clement Rogers, Architect, Louth.
,, Charles M. Nesbitt, Banker's Clerk, Louth.
,, Benjamin Crow, Mechanics' Institution, Louth, *Secretary.*

Local Board for King's Lynn.

Mr. Henry Edwards, St. Nicholas-street, Lynn, *Chairman.*
,, Lionel Self, Nelson-street.
,, Walter Moyse, King street.
,, F. R. Partridge, Littleport-street.
,, Joseph Kerkham, High-street.
,, J. J. Coulton, Tower-lane.
,, Edward L. King, Austin-street.
,, Henry Wells, Norfolk street.
,, John C. Wigg, Saturday Market-place.
,, William Cooper, High street.
,, David Ward, Tuesday Market.
,, James Nurse, King-street.
,, L. W. Jarvis, Mayor, Tuesday Market-place.
Rev. E. F. E. Hankinson, St. John's-terrace.
Mr. F. Kendle, Nelson-street.
Rev. Thomas White, Grammar School.
,, W. Leeper, Goodwin's-fields.
,, J. T. Wigner, London-road.
,, J. F. James, Lynn.
Mr. John Lowe, M.D., King-street.
,, T. Burton, 16, Buckingham-terrace, Lynn, *Secretary.*

Local Board for Macclesfield.

Mr. William Bullock, silk merchant, Cumberland House, Macclesfield, *Chairman.*
,, T. U. Brocklehurst, Fence House, Hurdsfield.
,, Matthew Clarke, Book-keeper, Park-green, Macclesfield.
,, Richard Higson, Silk Manufacturer, Macclesfield.
,, Samuel Rushton, Silk Warehouseman, Macclesfield.
,, Thomas Smith, Book-keeper, Brook-street, Macclesfield.
,, Samuel Greg, The Mount, Bollington. Macclesfield.
,, Charles Pickford. Solicitor, Buxton-road, Macclesfield.
,, George Barton, Silk Warehouseman, Jordan Gate, Macclesfield.
,, W. Barnett, Bookbinder, Chester-road, Macclesfield.
,, William Reddish, Silk Warehouseman, Derby-street, Macclesfield.
,, Samuel Hill, Silk Manufacturer, Bridge-street, Macclesfield.
,, George Stewart, Master of the School of Art, Beech-lane, Macclesfield, *Secretary.*

Local Board for Manchester.

The Mayor of Manchester, Abel Heywood, Esq., *Chairman.*
Professor J. G. Greenwood, B.A., Principal of Owen's College.
Rev. Canon Richson, Shakespeare-street, Manchester.
,, Alfred Newth, Professor, Lancashire Independent College, near Manchester.
Professor Theophilus Hall, M.A., Lancashire Independent College, near Manchester.
Professor Bowman, M.A., Victoria-park, Manchester.
Mr. W. Fairbairn, LL.D., F.R.S., Polygon, Ardwick.
,, John Curtis (Curtis and Dallow), York-street, Manchester.
,, R. M. Pankhurst, LL.B., St., James's-square, Manchester.
,, R. A. Bubier, M.A., Bowdon, Cheshire.
,, Joseph Manchester, Chepstow-street, Manchester, } Representing the Manchester Mechanics' Institution.
,, Harry Rawson, Market-street, Manchester, }
,, R. Rumney, Ardwick Chemical Works.
,, Edwin Simpson, Manchester Mechanics' Institution, *Hon. Secretary.*

*** Local Board for Marske (near Redcar) Literary Society (Yorkshire Union).

Mr. Thomas Marley, Draper, Vice-President Marske Literary Society, *Chairman.*
,, William Little, Agent, Marske.
,, George Middleton, Commission-Agent, Marske.
,, Robert Richardson, Marske, near Redcar, *Hon. Secretary.*

Local Board for Middlesborough.

Mr. E. Gilkes, Middlesbro' on-Tees, *Chairman.*
Rev. R. Bradley, Middlesbro'.
,, A. C. Smith, Middlesbro'.
Mr. J. Jordison, Middlesbro', Printer.
,, E. Grove, Middlesbro', Agent.
,, Isaac Wilson, Middlesbro', Ironmaster.
,, John F. Wilson, Middlesbro', Ironfounder.
,, William Taylor, Mechanics' Institute, Middlesbro', *Secretary.*

Local Board for Newbury.

Rev. J. L. Randall, M.A., Newbury, *Chairman.*
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Dr. Silas Palmer, M.D.
Dr. Joseph Bunny, M.D.
Mr. Joseph Vines, Solicitor.
,, F. Talbot, Solicitor.
,, T. Gurney, Bank Manager, Newbury, *Secretary.*

Local Board for Newcastle-on-Tyne Church of England Institute.

Rev. James Snape, Royal Grammar School, Newcastle, *Chairman.*
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,, J. D. Parker, LL.B., All Saints'.
,, W. Spencer, B.A., Educational Establishment, Clayton-street.
,, G. S. Gruggen, M.A., St. Thomas's, Newcastle.
Mr. Joseph Forster, St. John's School, Newcastle-on-Tyne, *Secretary.*

Local Board for Newcastle-on-Tyne Mechanics' Insititute.

Rev. James Snape, *Chairman.*
Mr. J. W. Kirke.
,, L. Goodchild.
,, W. Lyall.
,, T. Harbottle.

Mr. John Dickinson.
,, James Kilgour.
,, Rt. McCulloch.
,, Adam Carse, Newcastle-on-Tyne, *Secretary.*

Local Board for Nottingham.

Mr. E. Patchitt, Solicitor, Forest House.
,, Alderman Heyman, J.P., Lace Merchant, West Bridgeford.
,, R. Enfield, Solicitor, Postern-street.
Rev. J. Matheson, Castlegate.
Mr. T. B. Gill, Newcastle-terrace.
,, Louis Leipmann, Lace Manufacturer, College-villas.
,, R. Birkin, J.P., Mayor of Nottingham, Aspley Hall.
,, H. B. Campbell, Solicitor, Nottingham-park.
Dr. W. Tindal Robertson, M.D., Nottingham, *Secretary.*

Local Board for Oldham.

Mr. John George Blackburne, F.G.S., Civil Engineer, President of the Lyceum, Union-street, *Chairman.*
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,, R. M. Davies, Waterloo-road, Oldham.
,, C. W. Robberds, Lyon Damm, Oldham.
Mr. Frederick Bromley, M.R.C.S., Curzon-street.
,, John Taylor, Cotton Spinner, Waterloo-road.
,, Frederick Hughes, Railway Agent, Greenhill, Oldham.
Rev. John Hodgson, Queen-street, Oldham, *Secretary.*

Local Board for Paisley.

Mr. Thomas Coats, of Ferguslie, *Chairman.*
" William Philips, of Crossflat, Paisley.
,, Jas. J. Lamb, Architect, Underwood-cottage, Paisley.
,, David Murray, Surveyor, H.M. Customs, Greenock.
,, William Mackean, Soap Manufacturer, St. Mirren's, Paisley.
,, A. R. Pollock, Commission Agent, Greenhill, Paisley.
,, J. M. Symington, Commission Agent, Oakshaw House. Paisley.
,, James Reid, Teacher, High-street, Paisley.
,, Thomas MacRobert, Solicitor, Paisley.
,, Peter Kerr, Thread Manufacturer, Whitehaugh.
,, Robert Wilson, Engineer, Smithhills.
Rev. Andrew Wilson, Abbey Manse.
,, William Frazer, Free Middle Manse.
,, James Brown, Love street.
Mr. John Lorimer, Accountant, West Croft, Paisley.
,, Wm. Gillespie, Slate Merchant, Paisley.
,, Wm. Porteous, Draughtsman, Barclay-street.
,, Lachlan McTavish, Teacher, Causeyside.
,, Andrew Foulds, Accountant, Storie-street.
,, John Broom, Draughtsman, Paisley.
,, Wm. Brunton, LL.D., Grammar School, Paisley.
,, Robert Crawford, Pattern Designer, Park-place, Paisley.
,, Alexr. Mackintosh, Tin Plate Manufacturer, Victoria-place, Paisley.
,, Charles Dalton Wason, Teacher, St. George's School, Paisley, *Secretary.*

Local Board for Pembroke Dock.

Mr. W. E. Seccombe, Her Majesty's Dockyard, *Chairman.*
,, J. A. Long, schoolmaster, Pembroke Dock.
,, W. Mitchell, Her Majesty's Dockyard.
,, J. Richardson, Her Majesty's Dockyard.
,, W. Jones, Clerk, Her Majesty's Dockyard.
,, W. Jones, Her Majesty's Dockyard.
,, T. H. Eastlake, Her Majesty's Dockyard, Pembroke Dock, *Secretary.*

Local Board for Peterborough.

Rev. W. Cape, Minster Precints, Peterborough, *Chairman.*
Mr. H. Porter, M.D., F.G.S., Bridge-street, Peterborough.
,, T. J. Walker, M.B., Westgate, Peterborough.
Mr. J. Whitwell, Mill-field, Peterborough.
,, J. Sturton, Bridge-street, Peterborough.
,, Pollard, New-road, Peterborough.
,, J. Speechley, Boonfield, Peterborough.
,, C. T. Cotton, Long-causeway, Peterborough, *Secretary.*

Local Board for Poole.

Rev. R. Wilkinson, Rector of St. James's, *Chairman.*
,, R. T. Verrall, Independent Minister.
Edward Lacy, Esq., Surgeon, High-street.
Joseph Harker, Esq., Solicitor, West-street.
Mr. A. S. Hodges, Draper, High-street.
,, Edwin Sloper, Accountant, } *Hon. Secretaries.*
,, Robert Belben, Longfleet, Poole, }

*** Local Board for Portsmouth.

Rev. Thomas Main, *Chairman.*
,, W. S. Phelps.
Mr. Henry Cradock.
,, Robert Rawson.
,, Thomas Brown.
,, Andrew Murray, Her Majesty's Dockyard, Portsmouth, *Secretary.*

Local Board for Richmond.

Rev. Harry Dupuis, B.D., Vicar of Richmond, *Chairman.*
Dr. James Ellis, Petersham, S.W.
Rev. J. B. French, Montague-villas, Richmond, S.W.
Mr. Gould, Kingston-on-Thames, S.W.
,, W. J. Maxwell, Cedar-grove, Richmond, S.W.
Rev. James Wilkie, Richmond-green.
Mr. W. A. Older, Carrington Lodge, Richmond, S.W.
Rev. W. Rigg, M.A., Grammar School, Norbiton, S.W.
,, William Bashall, A.M., Richmond-hill, S.W., *Secretary.*

Local Board for Rotherham.

Mr. James Yates, Oakwood-house, Rotherham, *Chairman.*
,, J. W. Brookes, Master of the Wesleyan Day School.
Rev. F. J. Falding, D.D., President of Rotherham College.
Mr. E. A. Fewtrell, Rotherham
,, John Guest, Moorgate-cottage, Rotherham.
,, M. H. Habershon, Holmes, near Rotherham.
,, J. Hardwicke, M.D., Rotherham.
,, S. B. Poles, Rotherham.
,, Steane, Master of the British School.
,, Henry Wigfield, Rotherham.
,, Fredk. Edwards, Solicitor, Rotherham, } *Secretaries.*
,, W. Unwin, Currier, Rotherham, }

*** Local Board for Ryde.

Rev. J. S. Barrow, M.A., Curate of Trinity Church, Ryde, *Chairman.*
Mr. Joseph Paul, Principal of Naval School, Ryde.
,, J. Burgess, Schoolmaster, Nelson-street, Ryde.
Rev. G. C. Colthard, Minister of Congregational Church.
Mr. J. Jenkins, Master of the British School, Albert-street, Ryde.
Benjamin Kent, M.D., St. John's, near Ryde.
Rev. C. A. Bury, M.A., Sandown.
Theodore Treakell, Professor of Music, Ryde.
Mr. Hyde Pullen, Principal of an Educational Establishment, Ryde.
Mr. Benjamin Barrow, F.R.C.S. Eng., M.B.M.S., Ryde, *Hon. Secretary.*

Local Board for Salford.

His Worship the Mayor of Salford, *Chairman.*
Rev. J. B. Kennerly.
,, George Clarke.
H. C. Oats, Esq., LL.B.

John Edwards, Esq., LL.B.
Charles O. Neile, Esq., I.C.S.
Mr. Charles Bradbury.
,, Alderman Davies.
,, Alfred Jones.
,, Samuel Porter.
,, William Hindshaw.
,, Councillor Platt.
,, Chas. Kellett
,, J. W. Gibson
,, William Noar, Town Hall, Salford, *Hon. Secretary.*

Local Board for Scarborough.

Rev. B. Evans, D.D., Scarborough, *Chairman.*
Samuel Bailey, Esq., 21, Alma-square, Scarborough.
Rev. R. Balgarnie, Victoria-parade, Scarborough.
Henry Walker. Esq., 12, Crescent, Scarborough.
Mr. Richard Huie, jun., 38, Queen-street, Scarborough.
,, William Rowntree, Newboro'-street, Scarborough.
,, John Drinkrow Hall, Victoria-place, Scarborough.
,, William B. Richardson, North Marine-road, Scarborough.
Rev. Robert Mitford Taylor, M.A., Vicar of Humanby, York.
,, Charles Shebbear, M.A., Vicar of Wykeham, York.
,, Charles Johnstone, M.A., Vicar of Hackness, Scarborough.
,, Thomas Noon Jackson, M.A., Filey.
Mr. John Richardson Travis, Scalby, Scarborough.
,, Robert Turnbull, Land Agent, Hackness, Scarborough.
,, Thomas Shields, } Town Hall, Scarborough, *Secretaries.*
,, John Edmond, }

Local Board for Selby.

Mr. Thomas Cutting, Druggist, Selby, *Chairman.*
,, C. F. Empson, Surgeon, Selby.
,, John Foster, Seed Merchant.
,, Charles Hutchinson, Seed Merchant.
,, George Jones, Schoolmaster.
,, W. H. Nicholson, Railway Stationmaster, Selby.
,, Charles Smith, Guano Merchant, Selby.
,, Richard Taylor, Schoolmaster.
,, John Westwood, Schoolmaster.
,, William Allison, Bank Manager, Selby, *Secretary.*

Local Board for Sheffield.

The Rev. Canon Sale, D.D., Vicar of Sheffield, *Chairman.*
Mr. Edmund Thorold, M.A., Vice-Principal of the Collegiate School.
Rev. Dr. Charles Ebert, Collegiate School.
Dr. Bingley, F.C.S., Whitley Hall, near Sheffield.
Mr. E. Birks, People's College.
,, R. Leader, Newspaper Proprietor, Burngreave, near Sheffield.
,, T. Rowbotham, People's College, Sheffield, *Secretary.*

Local Board for Skipton.

Mr. Stephen Bailey Hall, Skipton, *Chairman.*
,, John Bonny Dewhurst, Skipton.
,, George Robinson, Bailey-terrace, Skipton.
,, George Kendall, Skipton, *Secretary.*

Local Board for the Mechanics' Institution, Slough.

Rev. J. A. Cree, B.D., Upton-park, *Chairman.*
,, A. G. Begbie, M.A., Slough.
Mr. Edward Brown, Slough.
,, Wm. Bonsey, Slough.
,, Wm. Deverill, Plumber, Slough.
,, George Kershaw, Upton, Slough.
,, E. A. Layton, Upton-grove, Slough.
,, A. Merrielees, Upton-park, Slough.
,, Henry F. Nash, Upton-lee, Slough.
Rev. A. W. R. Quinlan, B.A., Slough.
,, G. Robbins, Slough.
Mr. F. R. Saye, Upton-park, Slough.
,, Brunnell Smith, Solicitor, Slough.
Rev. R. Sykes, M.A., Slough.
Mr. James Chapman, Upton-grove, Slough, *Hon. Secretary.*

*** Local Board for Southampton.

Steuart Macnaghten, Esq., J.P., Bittern Manor-house, Southampton, President of the "Athenæum," *Chairman.*
Dr. Francis Bond, Curator of the Hartley Institution.
Rev. Mark Cooper, M.A., Rector of St. Mary's, Southampton.
,, John Hill, M.A., Congregational Minister, Havelock-terrace, Southampton.
,, Edmund Kell, M.A., F.S.A., Unitarian Minister, Portswood Lawn, Southampton.
Dr. Eveleigh, Surgeon, (late Professor in South African College), Hamilton-terrace, Southampton.
Mr. W. Johnson, Southampton Athenæum, *Secretary.*

Local Board for the Southern Counties Adult Education Society.

Hon. and Rev. S. Best, the Rectory, Abbott's Ann, Andover.
Rev. Thomas Bacon, the Rectory, King's Worthy, Winchester.
,, T. H. Tooke, St. Edmund's, Salisbury.
,, W. F. Tregarthen, Osmington, Weymouth.
,, M. Wilkinson, D.D., West Lavington, Devizes.
Wyndham S. Portal, Esq., Malshanger, Basingtoke.
Charles Raikes, Esq., Netheravon-house, Amesbury.
John Floyer, Esq., West Stafford, Dorchester.
Rev. N. Ridley, Hollington-house, Newbury.
,, G. Fitzgerald, Winslade, Basingstoke.

Local Boards for the South Staffordshire Association.

Right Hon. Lord Lyttelton, *Chairman.*
Bilston Centre.—Revs. A. H. Hodd, C. W. Richards, and J. W. Bain; Messrs. W. Hatton, E. Pugh, J. Hague, D. Kendrick, and J. Bradbury. Rev. H. F. Newbolt, Bilston, *corresponding member.*
Cradley Centre.—Revs. J. Bromley, Harris, J. Benbough, and Fisher; Messrs. J. P. Hunt, N. Hingley, J. Fennell, T. Wood, and Fox. Rev. J. H. Thompson, Cradley, Brierly Hill, *corresponding member.*
Dudley Centre.—Revs. Dr. Browne, J. Davies, E. H. L. Noott, J. J. Slade, and G. Lewis; Messrs. S. H. Blackwell, E. Grainger, E. Hollier, J. Stokes. T. Wright, and Lucas. Mr. Jones, The Triudle, Dudley, *corresponding member.*
Kinver Centre.—Rev. George Wharton; Messrs. W. Bennitt, T. Y. Lee, James Williams, and T. Holyoake. Mr. Thomas Bolton, Hyde House, *corresponding member.*
Smethwick Centre.—Revs. H. B. Bowlby, T. G. Simcox, J. Sheppard, John Cumming; Messrs. Henry Chance, John Chance, Charles Hicks, Edward Tunstall, and T. Malin. Mr. F. Talbot, *corresponding member.*
Stourbridge Centre.—Revs. H. Sherrard, J. Williams, J. Welch, J. Richards; Messrs. W. H. King, W. Akroyd, W. England, Josh. Maurice, T. R. Southall, J. Taylor. Rev. J. W. Grier, Amblecote, Stourbridge, *corresponding member.*
Walsall Centre.—Revs. J. H. Sharwood, Dr. Gordon, Rathbone, and Hammerton; Messrs. T. Crump, W. Eagles, J. Vaughan, J. Pritchard, and J. Lindop. Mr. Peter Potter, jun., Bridge-street, *corresponding member.*

Wednesbury Centre.—Rev. R. Garland; Messrs. W. Lynes, R. Williams, J. Bailey, Thomas Southern, S. Zachary Lloyd, Johnson, Reynolds, and Quelch. Mr. Charles Britten, Market-place, *corresponding member.*

West Bromwich Centre.—Revs. J. Bradshaw, F. B. N. Hutton, J. Whewell; Messrs. G. Thompson, J. Cooksey, J. Hall, W. H. Bagnall, R. Haines, Thomas Davis, T. Crabtree. Mr. E. Robinson, High-street, *corresponding member.*

Wolverhampton Centre.—Revs. J. H. Iles, T. H. Campbell; Messrs. W. Y. Brevitt, W. M. Fuller, G. Bidlake, Herridge, Hoult, Butt. Mr. J. N. Langley, Mowbray House, Wolverhampton, *corresponding member.*

Willenhall Centre.—Revs. G. Fisher, M. Hathaway, J. Stevens; Messrs. Loy, L. Chapelle, and J. Tildesley. Mr. J. Bennett, *corresponding member.*

Wordsley Centre.—Revs. R. Girdleston, E Stevens; Messrs. Hill, Price, F. and G. Mills, Bill, Newman, and Abbott. Rev. J. Boultbee, Wordsley, *corresponding member.*

Mr. John Jones, The Trindle, Dudley, *Secretary.*

Local Board for Thirsk.

Mr. Joseph Rider, Solicitor, Vice-President Thirsk Mechanics' Institute, *Chairman.*
Rev. E. Jowett, Carlton Miniott Parsonage, near Thirsk.
,, H. Howard. Salem-cottage, Sowerby, near Thirsk.
Mr. T. Alderwick, Thirsk.
,, R. Ashman, British and Foreign School, Thirsk.
,, H. Bourne, Mowbray-place, Thirsk.
,, R. D. Carter, Sowerby, near Thirsk.
,, Duncan, Sowerby.
,, Peter Davidson, Thirsk.
,, Charles Fisher, Academy, Sandhutton.
,, John Hardisty, Schoolmaster, Sowerby.
,, G. Nicholson, Schoolmaster, Thirsk.
,, Thomas Scott, Secretary of Thirsk Mechanics' Institute.
,, J. G. Baker, Market-place, Thirsk, *Secretary.*

Local Board for Wakefield.

Dr. S. Holdsworth, M.D., Mayor of Wakefield, *Chairman.*
Rev. Goodwin Barmby, Unitarian Minister, Wakefield.
Mr. John Binks, Cornfactor, Wakefield.
,, T. W. Gissing, Pharmaceutical Chemist, Wakefield.
,, W. S. Banks, Solicitor, Wakefield, *Hon. Secretary.*

Local Board for Warminster.

Rev. T. E. Crallan, Lord Weymouth's School, *Chairman.*
Mr. Farmer.
,, G. T. Vicary.
,, Crispen.
,, Frank Morgan, Warminster Athenæum, *Secretary.*

Local Board for Waterford.

Dr. James Cavet, M.D., Beresford street, Waterford, *Chairman.*
,, J. F. Scott, M.D., Little George's-street, Waterford.
Mr. David Keogh, Quay, Waterford.
,, Joseph Fisher, William-street, Waterford.
,, James Dowling, Head Master, Model School, Waterford.
,, James Budd, Thomas-street, Waterford, *Secretary.*

Local Board for Wellingborough.

Mr. Benjamin Dulley, Surgeon, *Chairman.*
,, Mr. Edward Sharman, Architect.
Rev. J. F. Poulter, M.A.
,, H. V. Broughton, M.A., Vicar.
,, H. M. Roxby, M.A.
Mr. W. A. Rubbra, Bank Manager.
,, Matthew Reid Sharman, Solicitor.
,, William Dulley, Jun.
,, William R. Harrington.
,, Thomas S. Curtis, Wellingboro', *Hon. Secretary.*

Local Board for Wigan.

Mr. Henry Woods, M.P., *Chairman.*
Major-General the Hon. Jas. Lindsay, M.P.
Mr. J. T. Fitz-Adam, Barrister-at-law.
,, Thomas Byrom, J.P.
,, R. Bevan, J.P.
,, William Melling, Forge Master.
,, Samuel Royle, Jeweller.
,, Richard Lea, Spinner.
,, William Hardy, Agent.
,, W. S. France, Solicitor.
,, Thos. Shaw, Clerk.
,, Richard Winstanley, Surgeon.
,, Daniel Davies, Hatter.
,, William Leech, Agent.
,, Thos. Wall, jun., Bookseller.
,, Thos. Fisher, Surgeon.
,, James Seward, Dicconson-street, Wigan, *Hon. Secretary.*

Local Board for Wirksworth.

Dr. W. Webb, Wirksworth, *Chairman.*
Rev. F. H. Brett, Carsington West, Wirksworth.
Dr. Cantrell, Oak Cliff House, Wirksworth.
Rev. H. Harris, Wirksworth.
Mr. William Tomlinson, Mechanics' Institute, Wirksworth, *Secretary.*

Local Board for the Worcestershire Union of Educational Institutes.

John Slaney Pakington, Esq., Kents-green, near Worcester, *President.*
The Right Hon. Lord Lyttelton, Hagley-park, near Stourbridge.
The Hon. and Rev. William Henry Lyttelton, Hagley, near Stourbridge.
The Right Hon. Sir John Pakington, Bart., G.C.B., M.P., Westwood-park.
Sir Edmund Anthony Harley Lechmere, Bart., The Rhydd Court, near Upton-on-Severn.
T. Barwick Lloyd Baker, Esq., Hardwick Court, near Gloucester.
Edward Holland, Esq., M.P., Dumbleton, near Evesham.
H. F. Vernon, Esq , M.P., Hanbury Hall.
S. S. Dickinson, Esq., Brownshill, Stroud.
J. R. Nicholson, Esq., M.D., Redditch.
Mr. James Darke, Commission Agent, Malvern.
,, John Swinton Isaac, Banker, Worcester.
,, J. F. Lowe, Accountant, Railway Offices, Worcester.
,, F. Marcus, Schoolmaster, Bromsgrove.
,, Herbert New, Solicitor, Evesham.
,, W. Allen, Solicitor, Worcester.
Rev. William Lea, Droitwitch.
,, David Melville, Witley, near Stourport.
,, H. I. Sharpe, Kidderminster.
Rev. G. Lewis, Dudley.
Mr. Wright, ,,
,, Stokes, ,,
Rev. J. C. Lunn, Evesham.
Mr. W. Smith, ,,
Rev. R. Williamson, D.D., Pershore.
,, G. Swinden, ,,
Mr. C. J. Pace, Printer, ,,
Rev. Wm. Waterworth, Worcester.
Mr. J. H. Farmer, ,,
,, Charles Harris, ,,

Mr. F. Reeve, Worcester.
,, James Tree, Solicitor, ,,
Rev. W. Walters, Hanley Grange, near Upton-on-Severn. } *Hon. Secretaries.*
Mr. Josiah Jones, Solicitor, Worcester.

Local Board for York.

Rev. Canon Robinson, M.A., Principal of the Diocesan Training College, Lord Mayor's-walk, *Chairman.*
Mr. James Birchall, Government Lecturer on History, Training College, York.
,, Samuel William North, M.R.C.S., Castlegate, York.
Rev. Henry Vaughan Palmer, Trinity-lane, York.
Mr. William Tomlinson, F.R.A.S., the Groves, York.
Rev. George Rowe, M.A., Government Lecturer on Geography, Training College, York.
Mr. Charles Cumberland, Institute of Popular Science, &c., York, *Secretary.*

Home Correspondence.

STREET ILLUMINATIONS AND DECORATIONS FOR FETES.

Sir,—I regret to see the announcement of the appointment of a committee upon this subject. It appears to me derogatory to the Society, and a divergence from its path of usefulness towards the frivolous tendencies of the day.

Seeing the danger of these exhibitions, which, from the increasing railway accommodation, will be heightening every year, and knowing, as every one must who has witnessed an illumination, that it is the signal for license to the disorderly classes, had the Society appointed a committee to inquire into the practicability of extinguishing illuminations altogether by finding a substitute of some kind, it might, I think, seem fairly to bring the subject within its province. I am, &c.,

H. C. WHITE.

88, Great Tower-street, E.C., April 1, 1863.

PATENTS.

Sir,—With reference to Dr. Collyer's letter, in a recent number of your *Journal*, alleging that he had suggested to me the new application of purified gutta-percha or india-rubber, to certain articles of dress, for which I am now applying for letters patent, I beg to affirm that the statement in question is incorrect. I remember having casually mentioned to him my discovery, and he thereupon offered to join me in the expense of taking out a patent, but which offer I refused. I am, &c.,

PERCY ADDISON COLE.

9, Croydon-street, Bryanstone-square, W., April 1, 1863.

Proceedings of Institutions.

Shropshire Mechanics' and Literary Institution, Shrewsbury.—In the report of the committee for the year ending 31st December, 1862, the committee have the pleasure of testifying to its continued prosperity, and of stating that its funds, although not showing the increase it anticipated last year, has in no wise diminished. During the twelve months just elapsed there has been an unusual fluctuation in the numbers of the society, the Institution having lost, from deaths and other causes, as many as thirty-four members and eleven students; but this great decrease has, however, been more than compensated by the enrolment of fifty-one new members and twenty-seven new students, a circumstance greatly gratifying to the committee, as illustrative of the success which has attended their efforts in giving wide publicity to the manifold advantages of the Institution. At the same time they would call particular attention to this fluctuation as exemplifying the constant necessity for individual exertion, in order to maintain the efficiency of the society. With profound regret the committee have to record in this report the great loss the Institution has sustained by the much-lamented death of its late president, R. A. Slaney, Esq., whose unremitting kindness and generosity, from the very foundation of the Mechanics' Institution, has contributed in a very material degree to its past and present stability. But while they regret this loss, they deem the society fortunate in possessing so able and valuable a successor as William James Clement, Esq., to whom they are much indebted for his exceedingly eloquent and interesting inaugural address, and likewise for the active interest he evinces in the welfare of the Institution. The committee have here to tender their acknowledgments to the Rev. R. H. Cobbold, M.A., Broseley, for his very instructive and interesting lecture on "Tea, Rice, and Opium;" but they have also to express their surprise at the small attendance of members on that occasion, which affords them little encouragement to continue their efforts in this popular mode of providing instruction. Notwithstanding, they have the pleasure of announcing lectures early in the present year from the Rev. Doctors Kennedy and Bowles, and also Reverends T. Bucknall Lloyd and James Colley. In order to extend as much as possible the province of the library, the committee have entered into an arrangement, for the winter months, for a supply of the new works of the day from Mudie's library, the extra cost being defrayed by a small contribution from those members who participate in the advantages of this special subscription. No necessity having been manifested for any classes, except one in book-keeping, this alone has been in operation during the past year; but recently an application was made to the committee to allow the establishing of a class in chemistry, which they will have much pleasure in promoting. The balance-sheet shows that the income has been £135 14s. 2d., and that there is a balance in hand of £25 13s. 2½d.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 18th March, 1863.

Par. Numb.
97. Spirits—Returns.
102. Cemeteries—Return.
106. Charitable Donations and Bequests (Ireland)—Return.
107. Private Bills (Metropolis)—Copies of Reports.
Ordnance Survey and Topographical Depot—Report.
Thames Embankment Commission 1862 and 1863—Report.
29. Railway and Canal, &c., Bills; (126. Bann Navigation Improvement: 140. Great Western and West Midland Railways Amalgamation; Great Western, West Midland, and South Wales Railway Companies Amalgamation; 141. Itchen Bridge; 142. North London Railway; North Staffordshire Railway (Additional Powers); North Staffordshire Railway (Madeley and Drayton Branches); 143. Rixton and Warburton Bridge; 144. Southampton and Itchen Floating Pier; 145. Tees Conservancy; 146. West London Docks and Warehouses)—Board of Trade Reports.

Delivered on 19th March, 1863.

24. Joint Stock Companies (Limited)—Return.
61. Bills—Sale of Gas Act Amendment.
65. ,, Thames Embankment (South Side).
Statistical Tables relating to Foreign Countries.

Delivered on 20th March, 1863.

63. Bills—Statute Labour Roads and Bridges (Scotland).
64. ,, Statute Labour Roads and Bridges (Scotland) Transfer.
66. ,, Tobacco Duties (as amended in Committee and on re-commitment).
Italy and Malta (Extradition of Criminals)—Ordinance and Correspondence.
29. Railway and Canal, &c., Bills (147. Great Eastern Railway (Steamboats); 148. Morayshire Railway; 149. North British Railway (Steamboats); 150. Ringwood, Christchurch, and Bournemouth Railway; 151. Scottish Central Railway; 152. Sligo and Ballaghaderreen Junction Railway; 153. Southampton Port, Harbour, and Pier; 154. Tottenham and Hampstead Junction Railway; 155. Vale of Neath Railway—Board of Trade Reports.

Delivered on 21st and 23rd March, 1863.

110. Bullion—Return.
111. Education—Correspondence.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Entomological, 7.
Medical, 8½. Dr. Leared, "On the Treatment of Phthisis by the Hot Air Bath."
Royal Inst., 2. General Monthly Meeting.
Geologists Association, 7. Mr. E. Charlesworth, "Observations on Ammonites, and on the Group of Molluscous Animals to which Naturalists refer these curious and beautiful Extinct Shells."
Tues. ...Pathological, 8.
Photographic, 8.
Anthropological, 7½.
Architectural Museum, South Kensington, 7½. Mr. G. J. Wrigley, "On Mediæval Studies in Palestine."
Wed. ...Society of Arts, 8. Mr. Edwin P. Alexander, "On the Sewing Machine; its History and Progress."
Graphic, 8.
Microscopical, 8. Conversazione.
Literary Fund, 3.
Archæological Association, 8½. 1. Mr. Chas. Long, "On a Discovery made at the Priory of St. John the Baptist, Holywell, Shoreditch." 2. Rev. C. H. Hartshorne, "On Queen Eleanor's Cross at Northampton." 3. Mr. Syer Cuming, "On a Holy Sepulchre, Glastonbury Abbey."
Fri. ......Astronomical, 8.
Archæological Inst., 4.
Sat. ......Royal Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

Applications for Patents and Protection Allowed.

[*From Gazette, March 27th*, 1863.]

Dated 15th November, 1862.

3072. C. Binks, Parliament-street, Westminster—Improved methods of and apparatus for treating linseed and other oils and fats.

Dated 17th February, 1863.

431. E. Deville, 95, Rue Blanche, Paris—Imp. in floating or life preserving coats or garments. (A com.)

Dated 24th February, 1863.

499. J. Clay, Sparkhill, near Birmingham—Imp. in the manufacture of saddles.
503. J. W. Burton, Leeds—Imp. in the bearings and leashes of axles and shafts.

Dated 26th February, 1863.

535. H. Edmonds, M.D., Peel-lodge, Stoke-road, Gosport—Imp. in the ventilation of ships and vessels, and apparatus connected therewith.

Dated 27th February, 1863.

550. W. Staufen, George-street, Portman-square—A new or improved fibrous substitute for human and other hair, to be used for all the purposes for which human and other hair is now used, and also for the manufacture of textile fabrics.
556. R. A. Brooman, 166, Fleet street—A new method of and apparatus for boring into water and gas supply pipes, and fixing branch pipes thereon. (A com.)
560. V. D. Delahaye, 7, Cauchoise-street, Rouen, France—Imp. in apparatus for cleaving and excavating pit coal and rock or earth.

Dated 2nd March, 1863.

586. W. Clark, 53, Chancery-lane—Imp. in preparing and obtaining photographic impressions, and in the application of such impressions. (A com.)

Dated 3rd March, 1863.

594. G. Price, Wolverhampton, and W. Dawes, Bolton—Imp. in burglar proof safes and strong room doors and frames.

Dated 4th March, 1863.

605. J. De Keyser, Molenbeek St. Jean, Belgium—Imp. in treating petroleum oil, and in the combination thereof with other oils for lubricating and other like purposes.

Dated 6th March, 1863.

620. E. P. Plenty and W. Pain, Newbury, Berkshire—An improved method of supporting screens and straw shakers, specially applicable to thrashing machines.
636. A. Wilson, 50, Lower Woodbridge-street, Clerkenwell—The better and more commodious manufacture of all kinds of easy, lounging, and invalid chairs, seats, or settles.

Dated 9th March, 1863.

654. Sir A. Keller, Zurich, Switzerland—An improved apparatus for reeling silk direct from cocoons or bobbins.

Dated 11th March, 1863.

660. R. T. Monteith, St. Malo, France, and R. Monteith, 64, Crystal-terrace, Cecil-street, Greenheys, Manchester—Imp. in making dyes from aniline and its analogues. (A com.)

Dated 13th March, 1863.

680. H. B. Barlow, Manchester—Certain imp. in looms for weaving. (A com.)
682. C. T. Lutwyche and A. Lutwyche, Birmingham—An imp. or imps. in metallic pens.
684. J. B. M. A. Bourreiff, 12, Rue des Petites Ecuries, Paris—Imp. in transferring by the means of typography colours and metals on surfaces in general.
686. A. Wydler and C. Thornton, Belfield Print Works, near Rochdale—Imp. in printing and dyeing woollen fabrics.
688. W. Smith, Little Woolstone, Buckinghamshire—Imp. in machinery for cultivating land and sowing seed.

Dated 14th March, 1863.

692. J. Page, Liverpool—Imp. in taps or valves.
694. J. Tangye, Birmingham—Imp. in portable hydraulic punching machines.
696. J. C. Richardson, Swansea—Imp. in the construction of ships.
698. R. Moreland, jun., Old-street, St. Luke's—Imp. in apparatus for making extracts of hops, and for selecting or separating the seeds and pollen from hops.
700. W. Boaler, Manchester—Imp. in the preparation of colouring matters for dyeing and printing. (A com.)

Dated 16th March, 1863.

704. W. Vernon, Nottingham—A new or improved means or apparatus for communicating signals or intelligence to or from railway trains or other similar conveyances, whether they be stationary or in motion.
706. T. Powell, 30, Prince's-terrace, Regent's-park—An improved chopping block for butchers.

Dated 17th March, 1863.

712. W. H. Atkinson, Cavendish Club, Regent-street—Imp. in studs or fastenings adapted to holding together parts of shirt fronts, wristbands, collars, gloves, and other articles of wearing apparel.
718. T. N. Miller, Bishop Stortford, Hertfordshire—Imp. in heating horticultural buildings.

Dated 18th March, 1863.

724. F. Richmond, H. Chandler, and J. G. Richmond, Salford, Lancashire—Imp. in machinery for washing potatoes and other vegetables.
726. H. Kilshaw, Haslingden, Lancashire—Certain imp. in looms for weaving.
730. F. Norrington, Tavistock, Devonshire—Imp. in girths or bands and knee caps for horses.

Dated 19th March, 1863.

736. H. Wilde, Manchester—Imp. in the construction of steam boilers.
738. J. Saunders and J. Piper, Kidderminster—Imp. in apparatus employed in the manufacture of tin and terne plates.
740. C. Webster, New Radford, and W. Forgie, Nottingham, Nottinghamshire—Imp. in apparatus for the purpose of clearing out the interior of foul chimnies or flues when on fire or otherwise.

Inventions with Complete Specifications Filed.

734. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in the manufacture of boots and shoes. (A com.)—March 19, 1863.
739. S. L. Crocker, Taunton, Bristol, U.S.—A new and useful or improved yellow metal sheathing nail or spike, which, by means of a nail cutting engine, is cut from yellow sheathing metal.—19th March, 1863.

Patents Sealed.

[*From Gazette, March 27th*, 1863.]

March 27th.

2467. J. Addison.
2654. A. Prince.
2659. B. Donkin.
2671. R. Broadbent.
2673. W. Clark.
2678. J. Lee and W. Lee.
2680. A. Barclay.
2681. W. E. Gedge.
2686. F. Watkins.
2687. F. E. Blatspiel.
2690. F. Johnson.
2692. R. Page.
2696. S. Holland.
2700. S. F. Cox.
2764. H. Bridson and J. Alcock.
2776. E. Molyneux.
2778. J. H. Jenkinson.
2783. P. Potenza.
2785. F. F. Prud'homme.
2822. N. R. Hall and M. L Parnell.
3024. W. Clark.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, March 31st*, 1863.]

March 23rd.

810. I. Holden.

March 25th.

778. J. A. Maxwell.
783. J. H. Johnson.
784. J. Church.
826. W. M. Chambers.

March 26th.

805. S. R. Smith.

March 27th.

798. J. L. Hancock.

March 28th.

870. J. Reidy.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, March 31st*, 1863.]

March 23rd.

692. J. Robertson.

March 24th.

680. H. Brierley.
788. W. Roberts.
874. J. Mash.

March 27th.

790. F. Grice.

March 28th.

814. E. Halliwell.

Journal of the Society of Arts.

FRIDAY, APRIL 10, 1863.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary.*

The subscription of each member is limited to one guinea.

The following additional names have been received up to the 9th inst.:—

Acland, Henry Wentworth D., M.D.	1	1	0
Acland, Sir Thomas Dyke, Bart., F.R.S.	1	1	0
Acland, Thomas Dyke	1	1	0
Alexander, Francis	1	1	0
Allhusen, Christian	1	1	0
Ash, George Claudius	1	1	0
Bainbridge, Robert Walton	1	1	0
Barnett, Miss M. G.	1	1	0
Barron, Frederick	1	1	0
Barron, W. J.	1	1	0
Bell, J. Lowthian	1	1	0
Bennoch, Francis	1	1	0
Birt, Jacob	1	0	0
Bohn, Henry George	1	1	0
Bolckow, Henry	1	1	0
Boyes, John	1	1	0
Bradley, John	0	10	0
Brooke, Thomas	1	1	0
Buchan, John Hitchcock	1	1	0
Buckley, Lieut.-General M.P.	1	1	0
Burn, R. Scott	1	1	0
Butter, Henry	1	1	0
Campbell, James	1	1	0
Chadwick, Edwin, C.B.	1	1	0
Challis, J. H.	1	1	0
Challoner, Colonel, C.B.	1	1	0
Churchward, Captain, J. G.	1	1	0
Clabburn, William H.	0	10	6
Clark, Rev. Samuel	1	1	0
Clarke, J. B.	1	1	0
Clarke, Robert	1	1	0
Clayton, Nathaniel	1	1	0
Clowes, George	1	1	0
Coles, William Fletcher	1	1	0
Collie, Alexander	1	1	0
Combe, James...	1	1	0
Cooper, Sir Daniel, Bart.	1	1	0
Cooper, David	1	1	0
Cooper, Henry	1	1	0
Copland, James, M.D., F.R.S.	1	1	0
Coutts, Miss. A. Burdett	1	1	0
Cowie, Rev. B. Morgan	1	1	0
Creswell, A. J. Baker	1	1	0
Day, C. A.	1	1	0
Davison, Robert, C.E.	1	1	0
De la Grangerie, Chevalier Dardenne	1	1	0
De la Rue, Warren, F.R.S.	1	1	0
Dixon, James	1	1	0
Dixon, Thomas	0	10	6
Driver, Henry	1	1	0
Duppa, Duppa	1	1	0
Eavestaff, W. G.	1	1	0
Edgworth, Thomas	1	1	0
Edwards, William	1	1	0
Falcke, David	1	1	0
Fenn, Joseph	1	1	0
Fenn, Joseph, jun.	1	1	0
Figgins, James, jun.	1	1	0
Fisher, Joseph Charles	1	1	0
Fraser, James William	1	1	0
Frith, John Griffith	1	1	0
George, John	1	1	0
Gretton, John	1	1	0
Harrison, William, F.G.S.	1	1	0
Harvey, Capt. John, R.N.	1	1	0
Healey, Edward	1	1	0
Hewlett, Alfred	1	1	0
Higgs, Samuel	1	1	0
Holland, William	1	1	0
Horne, Henry	1	1	0
Hunt, John	1	1	0
Hunt, Thomas	1	1	0
Iselin, John Frederick	1	1	0
Johnstone, James	1	0	0
Jones, James Patershall	1	1	0
Kay, John Robinson	1	1	0
Keeling, Edward Henry	1	1	0
Keeling, Henry L.	1	1	0
Kelly, Sir Fitzroy, M.P.	1	1	0
Kennedy, John	1	0	0
Kirtley, Matthew	1	1	0
Klaftenberger, Charles I.	1	1	0
Land, John	0	10	6
Lazard, Edward	1	1	0
Leigh, Evan	1	1	0
Litchfield, John	1	1	0
Losada, J. R de	1	1	0
Low, Robert	1	1	0
Mackay, Thomas Miller	1	1	0
Makin, Edwin John	1	1	0
Martin, Rev. Samuel	1	1	0
Monk, Frederick W.	1	1	0
Montefiore, Nathaniel	1	1	0
Morley, Samuel	1	1	0
Neilson, Walter Montgomerie	1	1	0
Oakley, J. Jeffryes	1	1	0
Obbard, Robert	1	1	0
Page, Thomas, M.Inst.C.E.	1	1	0
Paine, Mrs. Caroline	1	1	0
Paxton, Sir Joseph, M.P.	1	1	0
Prescott, W. G., F.G.S.	1	1	0
Purling, Charles	0	10	6
Radford, William T., M.D.	1	1	0

Richardson, F.	1	0	0
Richardson, Thos.	1	1	0
Roberts, David, R.A.	1	1	0
Roskell, Robert	1	1	0
Strong, Rev. William	1	1	0
Twining, Samuel Harvey	1	1	0
Winsor, Frederick Albert	1	1	0

SEVENTEENTH ORDINARY MEETING.

Wednesday, April 5, 1863.

The Seventeenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 8th inst., Peter Graham, Esq., Member of Council, in the chair.

The following candidates were proposed for election as members of the Society :—

Benbow, Vernon	69, Russell-square, W.C.
Carter, Robert	41, Victoria-street, Westminster, S.W., and The Grove, Epsom.
Cavell, Edward Strutt	6, Great Coram-street, and 5, Gray's-inn-square, W.C.
Child, Henry William Grace	27, Scarsdale-villas, Kensington, W.
Heaton, Clement	24A, Cardigan-street, Hampstead-road, N.W.
Mappin, Joseph C.	Clapham-park, S.
Ridsdale, Joseph	Montpelier House, Tufnell-park, N.
Tunstall, Wm. Croudson.	Gloucester.

The following Candidates were balloted for and duly elected members of the Society :—

Beech, Thomas	6, Russell-place, Old Kent-road, S.E.
Beevor, Charles	41, Upper Harley-street, W.
Bell, Alexander	18, Harrington-square, N.W.
Carpenter, William	8, Brunswick-square, W.C.
Perkins, George	Chipsted-place, Sevenoaks.

The Paper read was—

ON THE SEWING MACHINE: ITS HISTORY AND PROGRESS.

By Edwin P. Alexander.

Impressed with the national and social importance of the sewing machine as one of the most valuable of the numerous labour-saving machines of the nineteenth century, I approach my subject with some diffidence, and regret, for your sakes, that abler hands than mine have not been deputed to bring it before this Society.

Such information, however, as I possess on the subject in question I gladly place at your disposal; and if I shall succeed in throwing any light upon the nature and merits of these indefatigable little seamstresses, I shall consider my labours have not been in vain. I appear before you this evening, not as the champion of any one in particular of the numerous varieties of sewing machines, but rather as an humble exponent of their general construction and *modus operandi.*

I propose, firstly, to trace the origin of the sewing machine; secondly, to explain the leading features of those varieties most generally adopted; and, thirdly, to lay before you a few statistical returns showing the rapid development of the art of machine sewing, and its important bearing upon the social well-being of a large portion of the community.

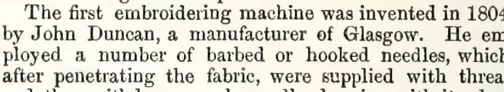
Although the art of sewing and embroidering is one of the most ancient of all arts, it is an astonishing fact that no successful attempt at its accomplishment by the aid of machinery was made until the commencement of the present century.

In tracing the origin of the sewing machine, a passing glance at some of the earlier efforts of inventors in this direction will be necessary, premising that to those efforts we are possibly to some extent indebted for the subsequent combinations of mechanism to which I shall presently have occasion to call your attention. Although apparently complicated, the sewing machine is in reality a very simple piece of mechanism. Its essential features are, first, a needle or hook for carrying a thread through the material, combined with apparatus for maintaining a proper degree of tension on the thread and for securing and tightening the stitch. Secondly, holding surfaces for supporting the material against the thrust and withdrawal of the needle at the immediate part where the stitch is being produced. Thirdly, adjustable self-acting mechanism for propelling or feeding the material under the needle as fast as each stitch is completed.

Prior to the existence of the first practical sewing machine the embroidering machine was well known, several ingenious contrivances having been proposed, and in some cases brought into practical operation, for embroidering or tambouring ornamental devices upon woven fabrics.

Attempts had also been made at the production of a sewing machine. In the embroidering machine a number of needles or hooks, each supplied with a separate thread, are caused to enter and leave the fabric simultaneously. The fabric is stretched over an open frame, which either receives a compound motion from special machinery governed by pattern surfaces, or is guided direct by the hand of the operator, so as to describe a course corresponding to the pattern to be embroidered, consequently, as many repeats of this pattern are simultaneously produced as there are needles in the machine. After each stitch is made the fabric is moved a step onwards equal to the desired length of stitch, but always in the course or direction of the figure to be produced.

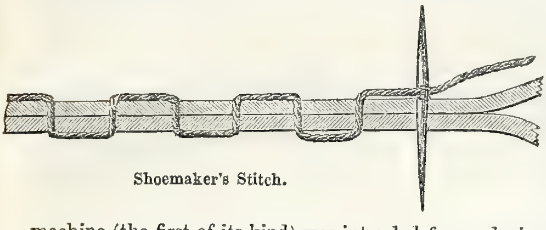
The first embroidering machine was invented in 1804, by John Duncan, a manufacturer of Glasgow. He employed a number of barbed or hooked needles, which, after penetrating the fabric, were supplied with thread and then withdrawn, each needle drawing with it a loop of thread through the fabric and through the previous loop. In Bock's machine of 1829 (better known, perhaps, as Heilmann's), the needles (of which about 150 were employed) had each an eye in the middle, and were pointed at both ends in order to obviate the necessity for reversing them after each passage through the fabric, for, unlike Duncan's, they were passed entirely through the fabric at each stitch, every needle being provided with a needleful or definite length of thread, in place of being supplied continuously from bobbins. An ingenious arrangement of pincers or nippers was employed on each side of the fabric for holding the several needles, and inserting and withdrawing them; in fact, we have here a very close imitation of the operation of hand-embroidering, substituting mechanical fingers for those supplied by nature. The double-pointed needle employed by Bock was patented in this country by Charles Frederick Weisenthal, in 1755, for hand embroidery. A Frenchman, of the name of Thimonnier, invented, in 1830, a machine for producing the tambour or chain stitch in gloves, by means of a hooked needle.



Chain or Tambour Stitch.

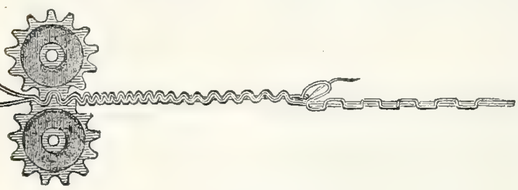
It was not found to be of any practical utility, and was soon cast aside. In 1835, Walter Hunt, of New York, occupied himself with the construction of a sewing machine, and was, I believe, the first to employ two continuous threads, producing what is now known

as the shuttle or lock-stitch, but he did not succeed in making a practically useful machine, and it was not until fifteen years after that the experiments were brought before the public on the occasion of certain law proceedings instituted by Elias Howe. In 1841 Messrs. Newton and Archbold patented a machine, which was subsequently put into practical use for embroidering the backs of gloves. The needles were made with an eye near the point, and operated in combination with hooks for catching the loops of thread passed upwards through the glove, and holding them in a suitable position for the passage through them of the succeeding loops, thus producing the chain-stitch. The gloves were contained in open metal frames or clamps, to which a self-acting step-by-step movement in one direction only was imparted at every stitch. One of the first sewing machines protected by patent in America was invented in 1842, by John Greenough, of the United States. This machine was intended for heavy leather work, but I cannot learn that it was ever put into practical operation. The sewing was to be produced by a thread passed through the material from opposite sides alternately by the aid of a double-pointed needle, worked by mechanical fingers or nippers, as in Heilmann's machine. This stitch was called the "shoemaker's stitch." Another variety of sewing



Shoemaker's Stitch.

machine (the first of its kind) was intended for producing a running or basting stitch similar to that made by hand. It was patented in the United States in 1843, and introduced here and patented in 1844, by Leonard Bostwick.

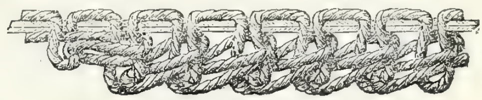


Running Stitch.

In this machine the fabric is crimped or corrugated by passing between a pair of geared-toothed wheels or crimpers, the folds so formed being pushed on to the needle, which is held stationary between the wheels. It is singular that, although the specification of Bostwick described a machine perfectly adapted for the purpose, it was not introduced into use in this country until a similar machine had been repatented by Morey in 1849, when Messrs. Mather and Platt, of Manchester, under Morey's license, made and introduced several hundreds of them for sewing together piece goods in bleach and dye works, and the same machine was also, at a later period, largely sold in Nottingham for attaching lace edgings to lace goods, for which they are well adapted, although the want of firmness and security in the stitch precludes their use for other purposes.

I now come to two fabric-ornamenting machines, which bear more closely upon my subject than any other of this class; I refer to Fisher and Gibbons' machines, patented the 7th of December, 1844. These are the first embroidering machines wherein it was proposed to employ two continuous threads interlooped or locked together for producing stitches, all the prior machines being adapted simply to the use of a single thread, either interlooped with itself as in Duncan's and Thimonnier's machine, or drawn entirely through the fabric from opposite sides alternately, as in Heilmann's and Greenough's machines.

These ingenious machines were entirely worked out and constructed by Mr. John Fisher, of Nottingham, and reflect great credit upon so young a mechanic, he being only 19 years of age at the completion of his arduous labours. Fisher was the inventor of the peculiar stitch now so well known as the Grover and Baker "knotted" or double-loop chain-stitch, but he merely applied it to the purposes of



Knotted or Grover & Baker Stitch.

ornamenting fabrics. Had he but turned his attention at that time, as I believe he subsequently did, to the production of a sewing machine, there is little doubt that with the knowledge he then possessed his efforts would have been crowned with success, and England would have gained the honour of giving birth to the sewing machine.

In one of Fisher's machines, which I shall call the looping-machine, the embroidering instruments employed consisted of a number of curved or bow-shaped needles, provided each with an eye near the point and another in the rear of the bend. These needles penetrated the fabric from below upwards, and were supplied with continuous threads from separate reels or bobbins. In conjunction with each needle, and operating above the fabric, there were two other instruments, the one a "looper," which was supplied from a bobbin with a separate thread of its own; the other a hook, for retaining the loop of needle-thread on the looper. The two threads were interlooped together so as to produce a double chain stitch of a highly ornamental character, and admirably adapted for embroidering purposes. In the second machine, which may be designated as the shuttle-machine, the ornamentation was effected by sewing threads, gimp, or yarn, in pattern upon the surface of the fabric to be ornamented, or by sewing a second fabric in pattern upon the first, portions of the second fabric being subsequently cut away between the patterns so as to produce the style of ornamenting known as *appliqué* work. In this machine a shuttle was used in combination with each of the bent or curved needles already described. This shuttle was supplied with thread or ornamenting cord, and traversed to and fro on the surface of the fabric passing through the open loop of the needle thread, which was protruded through the fabric from below upwards by the needle so as to interlock the shuttle thread or cord with the needle-thread. The stitch so obtained is precisely similar in formation to the lock-stitch produced by the sewing machine, but is not so tight, from the fact of there being no tension on the threads. Whilst these various machines

Lock or Shuttle Stitch.

were occupying more or less the minds of mechanics and inventors, the dawn of a grander achievement was breaking in America.

In the year 1841, Elias Howe, a native of Cambridge Port, Massachusetts, first conceived the idea of constructing a really practical sewing machine. I know of no higher example of patient industry and perseverance, indeed, I may say, of devotedness to science, than that displayed by Howe in his early career. A young mechanic, only 22 years of age, hardly capable of supporting himself and those most dear to him on his scant earnings, he laboured manfully, in a little garret in his native town, at his self-imposed task during the few hours that were spared to him after the ordinary labours of the day were ended. He became enthusiastic, and although, as he says, he

could not devote his attention to the subject during his working hours, he thought upon it when he could, both day and night. It grew upon him till he felt impelled to yield his whole time to it, and being promised assistance by a friend, he devoted himself exclusively to the construction and practical completion of his machine. The result was that in 1845 he perfected his first sewing machine, and, in order to test its practical success, he sewed with it all the principal seams in two suits of clothes. On the 10th of September, 1846, he obtained his patent. The machine in the glass case is a fac-simile of Howe's first sewing machine; it is kindly lent me by Mr. Bennett Woodcroft, to whom it was presented by Howe himself. In Howe's original machine a curved needle attached to the end of a vibrating lever was combined with a reciprocating shuttle for producing the lock-stitch. The needle had an eye near its point, and a groove formed along the upper and under sides, to allow of the thread lying therein and so passing more easily through the cloth. The cloth was attached to pins on the edge of a thin steel rib called a "baster plate," from the fact I presume of its serving the purpose of a basting thread in holding the two thicknesses of material together whilst being stitched. This plate formed a portion of the feed mechanism for propelling the cloth; it was carried along step by step by the teeth of a small pinion which geared into holes made in the baster plate, an intermittent rotatory motion being imparted to the pinion by self-acting mechanism working in concert with the needle and shuttle. This feed motion was found to be defective in many respects, and has since been entirely abolished in all sewing machines. The cloth was held in a vertical position against the side of the shuttle race, by a spring presser-plate at the part where the needle entered. The shuttle was driven to and fro in its race or groove by two strikers, carried on the ends of vibrating arms worked alternately by cams. The most important features embodied in this machine were the adaptation of suitable contrivances for imparting the requisite amount of tension to the needle and shuttle-threads, for taking up the slack formed on the needle thread when the needle enters the cloth, for tightening and drawing up the stitch, and for supporting the cloth against the thrust and withdrawal of the needle. Shortly after obtaining his patent in America, Howe sent over a machine to this country, and disposed of his invention to Mr. William Thomas for a trifling amount.

On the first of December, 1846, Mr. Thomas obtained a patent for the machine in England, soon after which Howe himself arrived here to assist him in adapting the machine to the peculiar kind of work required, namely, stay-making. Howe does not appear to have prospered here, for in the spring of 1849, indebted to a friend for a steerage passage home, he returned to America, poorer if possible than when he left. He found his wife on a bed of sickness and in a state of utter destitution. Ten days after his arrival she died. During his absence in England his patent had been extensively infringed, and in 1850 he commenced legal proceedings, and succeeded in every case in establishing the validity of his patent.

In the course of these proceedings a prior claim to the invention of the sewing machine was set up by Walter Hunt, who was said to have constructed, exhibited, and sold, in 1834 and 1835, shuttle or lock-stitch sewing machines, similar in all essential particulars to Howe's. That Hunt had tried his hand at a lock-stitch sewing machine, and was the inventor of the shuttle or lock-stitch, there is I think no doubt, but it was never satisfactorily proved that such machines were so far perfected as to render them more than abortive experiments. The turning point in Howe's career had now arrived, and fortune soon began to smile upon him. In 1853 he granted his first license, and in 1855 was enabled to regain possession of the whole of his patent, which at one period he had entirely disposed of, in order to meet the pressing demands that were made upon him. His patent rights being finally acknowledged, and his patent prolonged for a term of seven years, he now receives a royalty upon every sewing machine manufactured in the United States, producing an income of upwards of £50,000 per annum!

The parent machine has been blessed with a numerous progeny, of which but few have arrived at maturity. In this country alone upwards of 300 patents for improvements in sewing machines have been applied for, whilst in America 548 patents were obtained up to the end of 1862, and more than 1,200 applications filed. Many valuable improvements have been subsequently introduced into the sewing machine, both by Howe himself and others. The most important of these have relation to the cloth propelling or feeding mechanism, which was the defective part in Howe's original machine. The first step in this direction was made by Messrs. Morey and Johnson, in 1849, who substituted for the baster plate of Howe a horizontal reciprocating bar, having serrations on its upper surface, and working to and fro along the horizontal table or cloth-supporting surface of the machine. The cloth was held down upon the roughened surface of this bar by a spring presser plate, having a smooth under surface to allow the cloth to slip freely from under it when drawn along by the teeth or serrations of the feeding bar during its forward motion. As the cloth was constantly held in contact with the roughened surface of the feeding bar, the latter on its return was apt to carry the cloth back with it, and therefore a claw or pawl was employed for retaining the cloth as it was fed forward. In sewing seams of a constantly varying direction it is necessary to guide or turn the cloth under the needle, so that it may be fed in the direction required. Now, to do this effectually, the cloth should be comparatively free from pressure during the intervals between the formation of the successive stitches; in Morey's arrangement this was not the case. In 1850, Singer, of New York, applied to the sewing machine a wheel or cylinder having a roughened periphery for feeding the cloth, which arrangement is still extensively employed, and known as the "wheel feed." The wheel revolves intermittently in a vertical plane in one direction only, and derives its motion from a vibrating lever and frictional surfaces acting on the rim of the wheel. A portion of the periphery of this wheel projects slightly above the horizontal table or cloth plate of the machine, and the cloth is held down upon it by a presser foot, having a smooth under surface. At each movement of the wheel it carries the cloth along, and, as there is no back or return motion, the tendency to pucker, or draw back the cloth, is prevented. This description of feed is well adapted for straight or slightly curved seams and heavy work, but as the pressure on the cloth is constant, it does not admit of that rapid and free manœuvring of the cloth which is required in ornamental stitching or braiding. This objection has been remedied in some cases by causing the presser foot or plate to rise at each stitch, so as to leave the cloth or material free to be turned or guided in any desired direction. Mr. A. B. Wilson, of the Wheeler and Wilson Sewing Machine Company, brought out, in 1851, the most perfect arrangement of feed-motion for general purposes. The feed in question is known as the "four motion-feed." It consists of a serrated bar similar to Morey's, but in addition to the horizontal to-and-fro movement it receives an up-and-down motion, the horizontal and vertical movements being obtained from separate cams on the driving shaft. The serrated portion of this bar works through an opening in the table or surface upon which the cloth is laid, the latter being held down on the table by a yielding presser plate immediately above the serrations. In propelling the cloth the feeding bar first rises so as to bring its roughened surface in contact with the underside of the cloth, it then moves horizontally forward a certain distance according to the length of stitch desired, and carries the cloth along when it descends below the level

of the table, so as to free it entirely from contact with the cloth, and finally returns to its original position in readiness for the next traverse. According to another modification of this "four-motion" principle, the serrated feeding surface occupies the place of the presser plate, and is caused to operate upon the upper surface of the cloth, so that when the feeder rises during its return or back stroke, the cloth will be entirely free from pressure and held in position by the presence of the needle only. This modification is admirably adapted to ornamental stitching, as the cloth can be turned in any direction round the stem of the needle. In all these cloth-propelling mechanisms provision is made for varying the throw of the feeder so as to enable stitches of any desired length to be obtained.

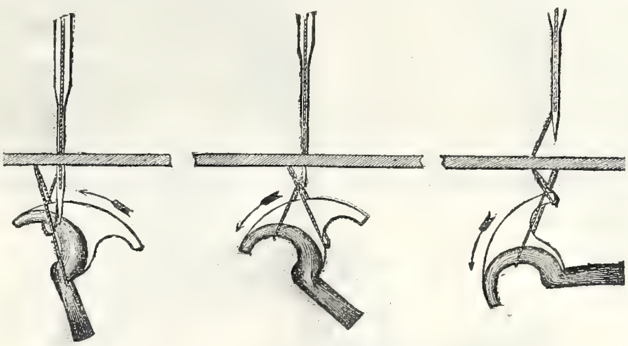
The various sewing machines now in use may be divided into two classes:—

Class 1. Comprising all machines using a single thread.

Class 2. Those machines employing two or more threads.

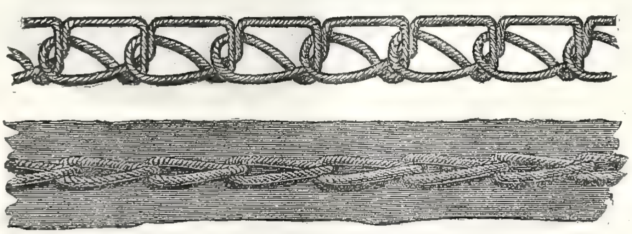
The only machines of any practical utility comprised under class 1 are Willcox and Gibbs' machine, and the waxed thread machines for stitching boot and shoe soles, harness, and other strong leather work. Under class 2 we have the lock-stitch and the "knotted" or double chain-stitch machines. The best examples of lock-stitch machines are those of Wheeler and Wilson, Howe, Singer, and Thomas; whilst for the "knotted" or double chain-stitch machines, the Grover and Baker Sewing Machine Company stands pre-eminent. By the kind permission of their proprietors, Iam enabled this evening to submit for your inspection specimens of all these varieties.

Many attempts have been made at the production of a good single-thread sewing machine, the idea having evidently struck inventors that if a secure seam could be produced from one thread in place of two, an undoubted advantage would be gained, since the fewer the threads and tensions to be regulated and looked after the simpler and cheaper the machine. In 1849, Messrs. Morey and Johnson first brought the chain-stitch sewing machine into something like a practical form, and since that period a host of inventors have worked upon the same idea, but without real success till, in 1857, Mr. Gibbs, of Millpoint, Virginia, without having seen a sewing machine, and knowing nothing of what had been done in that direction, constructed a rude model of a machine, which has since proved itself the best of its class. Having been improved and modified by Mr. Willcox, this machine is now known as the Willcox and Gibbs sewing machine. The sewing is produced by the combination of a straight



Willcox and Gibbs—Diagrams showing formation of Stitch.

eye pointed needle, with a peculiar rotating looper in the form of a double hook, having its points in reverse directions. On the stem of the hook there is formed a flattened spur, which serves to cast off and twist the loop; a simple form of under four-motion feed, actuated by a crank pin, serves to propel the fabric, which is held down upon the serrated feeding bar by a yielding presser foot. In the operation of stitching the needle descends and carries a loop of thread through the fabric, which loop is caught by the front hook of the rotating looper and receives a half turn or twist, the stitch produced being a twisted chain stitch, which is more secure than the



Twisted Chain-stitch.

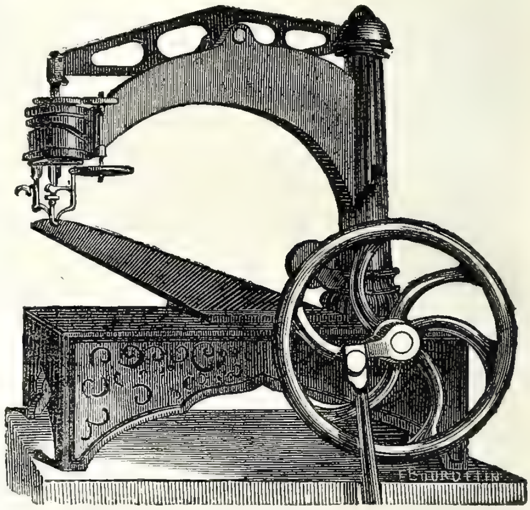
ordinary chain stitch. The cloth is fed forward and the needle descends again, bringing a second loop with it. This is in turn caught by the front hook, the preceding loop having in the meantime passed into the throat of the rear hook, which gradually withdraws from it, and allows it to be finally released only when it is nearly drawn up into the fabric. The rear portion of the looper which effects this operation is called by the inventor the "tension let off," inasmuch as it maintains a certain amount of tension on the loop after it has been in reality "cast off" from the looping hook, the object being to avoid any "kinking" or entanglement of the loop, which sometimes occurs in running at high speeds, if the cast-off loop be left perfectly slack and uncontrolled. The Willcox and Gibbs machine is exceedingly simple in its construction, and is the fastest and least noisy in its action. It is well adapted for family use, and is largely employed in the trimming trade. It is ordinarily run at

he rate of 1,500 stitches per minute, but can be worked up to 3,000 or 4,000.

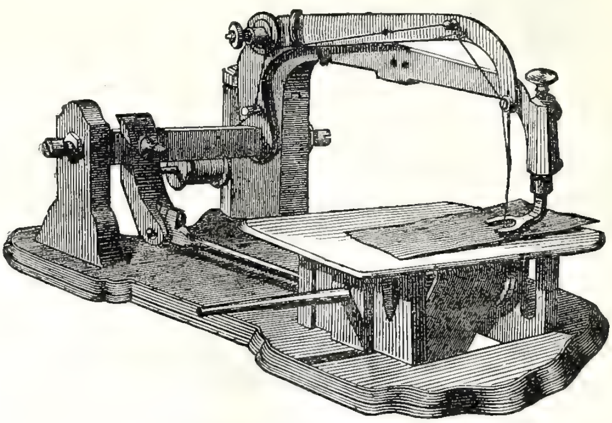
I attribute the former failure of the single-thread chain-stitch machines more to the defective construction of the machines (which were frequently liable to drop stitches) than to the stitch itself, as, when properly made, it will answer for most practical purposes, although it does not possess the stability of the "knotted" and lock-stitches.

In the waxed thread machines the stitch produced is the ordinary chain stitch, a hooked needle being generally employed for introducing the thread. It either descends through the material and draws up a loop of thread which has been supplied to it by a thread-carrier below, or it works from below upwards, and draws the loop down through the material and through the preceding loop. Two excellent examples of waxed thread machines were exhibited by Mr. L. A. Bigelow in the American Department of the International Exhibition. They were adapted for stitching boot and shoe soles to the uppers, and were capable of turning out 150 pairs of boots or shoes per diem.

In all reciprocating shuttle machines a certain loss of power is incurred in driving forward, stopping, and bringing back the shuttle at each stitch, whilst the machines are generally more noisy than those of any other description, owing to the striking of the driver against the shuttle at each fresh start. These objections have been most effectually removed in the Wheeler and Wilson machine, where the reciprocating shuttle is replaced by a stationary one, the locking of the needle thread with the shuttle thread being accomplished, not by driving the shuttle through the loop of the needle thread, but by passing that loop under the shuttle. To the end of the driving shaft is attached a peculiar circular hook, which is one of the most beautiful contrivances that has ever been introduced into this class of mechanism. Its function is to take the loop of thread, which is passed through the fabric by the needle, and carry it under the stationary shuttle, and then cast it off, so as to interlock the two threads, thereby producing the lock-stitch. (See woodcuts, next page.) The cast off loop is retained by a friction loop check until the next loop has been caught by the point of the hook. The shuttle is of a similar construction to the bobbins of a lace machine. It consists of two discs



Bigelow's Boot and Shoe Stitching Machine.

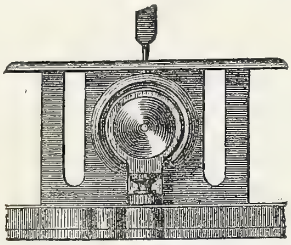


Wheeler and Wilson's Machine.

connected by a central axis, upon which, and between the discs, the thread is wound. This shuttle is of about the diameter and thickness of a florin, and fits loosely into a circular recess in the centre of the hook, being retained therein by an adjustable bracket or holder, which allows of sufficient lateral play in the shuttle to admit of the easy passage of the loop of needle thread round it. The only tension apparatus required in this machine is the one for the needle thread, the shuttle thread being always kept sufficiently taut by the tendency of the rotating hook to turn the shuttle, thereby keeping up a proper degree of tension in that part of the thread extending from the shuttle to the fabric. This is undoubtedly a great advantage, as the tensions in a sewing machine are really the most difficult parts to regulate, and, consequently, the fewer their number the easier will be the management of the machine. In this machine the tension of the needle thread is obtained by passing it once round a small grooved pulley, to which any degree of friction is applied by a nut acting upon a volute spring, which bears against one side of the pulley. The cloth is propelled by an under four-motion feed, and is held down thereon by a yielding presser foot, which is capable of being adapted to serve the additional purposes either of a hemmer or braider.

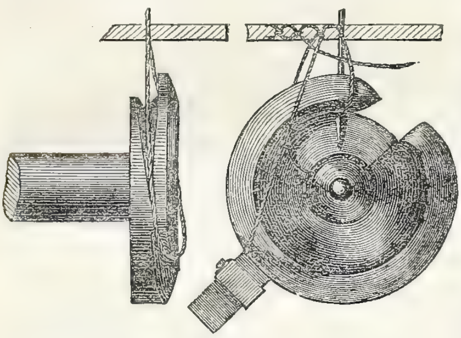
Having already explained to you Howe's first machine, let me now call your attention to his latest. The Howe sewing machine exhibited to you this evening is one of Elias Howe's most recently improved manufacturing machines, adapted for boot and shoe work, in which trade it is being very extensively employed. In adapting a sewing machine

to the stitching of tubular articles, such, for example, as the legs and uppers of boots and shoes, it is necessary to modify the shape of the table or surface which supports the material, so as to admit of a tubular article passing over it; consequently, in place of having a wide, flat table,



Wheeler & Wilson—Front Elevation of the Hook.

a narrow and long overhanging arm, or cylinder, is employed, upon which tubular work can be readily adjusted. This form of the cloth-supporting surface is common to all machines intended for the class of work referred to, and is generally known as the "cylinder machine," but the specimen before us contains other specialities, which are worthy of notice. In Howe's cylinder machine, the stitch

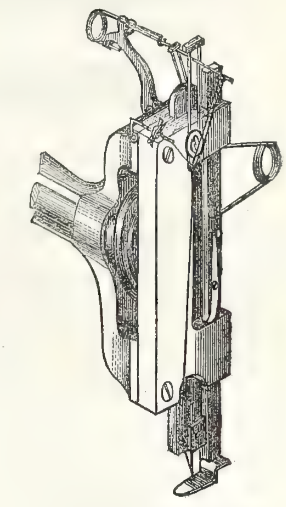


Vertical Section of the Thread Case.

Wheeler & Wilson—Details of the Hook.

is produced in a different manner to all other shuttle machines. In every other shuttle machine the needle remains in the material during the passage of the shuttle through the loop of the needle thread, but in this machine the shuttle does not pass through the loop until the needle is withdrawn from the material. The needle pierces the work, and then withdraws a certain distance clear of the material, leaving a loop of its thread behind it, through which loop a reciprocating shuttle passes with the second thread. The needle bar then rises still further, and draws up and tightens the stitch. The sewing produced on this machine has a closer and more regular appearance than that made on an ordinary lock-stitch sewing machine. The platform, or flat table machines, now constructed by Howe, are provided with a simple little contrivance for preventing the breaking of the needle occasioned by the point of the shuttle striking it during its passage, for which purpose a small wedge, actuated by an extra cam, presses against the needle inside the shuttle race, and holds it back clear of the shuttle's point. To obviate the missing of stitches by reason of the shuttle not catching fairly the loop of the needle thread, a deflector, or laterally adjusting needle slide, is employed, by adjusting which the needle may be brought nearer to or further from the side of the shuttle. This arrangement affords facility also for the adaptation of fine or coarse needles to the same machine. When a fine needle is used, the slide will require to be adjusted so as to bring the side of the needle nearer to the shuttle, and if a coarse needle be inserted, then the slide will require to be adjusted in the opposite direction, so that the extra thickness of the needle will present no obstruction to the passage of the shuttle. The tension of the shuttle thread is maintained by a small nipping spring inside the shuttle, in lieu of passing it through holes in the shuttle, as is usually the case, and facility is afforded for regulating the pressure of the presser foot according to the nature of the work. By these simple little contrivances an almost universal machine is obtained, capable of stitching the finest muslin or the strongest materials at the will of the operator.

The machine known as the Singer sewing machine is one of the oldest of the reciprocating shuttle variety, and was first introduced here in 1852. It is well adapted to boot and shoe work and all heavy manufacturing purposes. In addition to the wheel feed already described, Mr. Singer claims to have been the first to introduce the straight needle, carried by a slide, in substitution a curved needle attached direct to a

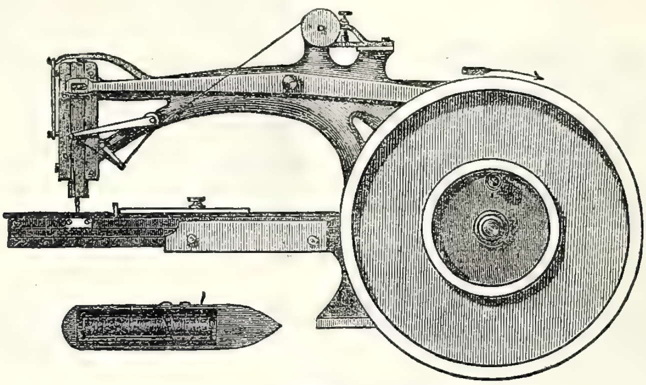


Singer's Take-up Lever Arm.

vibrating lever arm. For heavy work a straight needle, penetrating perpendicularly through the fabric, is essentially requisite, the curved needle being apt to spring and break when forced through leather and similar strong materials. In light working machines, however, the needle slide is unnecessary, and only entails extra friction and wear and tear of the working parts. The needle slide works in a vertical guide and is driven direct from a crank-pin working in a differential slotted piece attached to the slide. The slack of the needle thread is taken up and the tightening of the stitch effected by a spring lever arm actuated by the needle slide so as to descend and give out sufficient thread for forming the loop when the needle descends, and then to rise and tighten the stitch as the needle ascends.

Since his original patent of 1846 (now expired), Mr. Thomas has introduced several improvements, and, indeed, has completely remodelled the first Howe machine, retaining, of course, its essential features. As now manufactured, the Thomas machine is provided with a needle slide and straight needle, and is furnished with the top *four-motion* feed previously referred to. The needle slide is actuated by a vibrating lever arm worked by a cam groove formed in a disc which serves as the fly-wheel and driving pulley of the machine. The shuttle is carried to and fro along its race, in a direction at right angles to the feed or traverse of the fabric, by means of a forked driver actuated by another cam groove also formed in the fly-wheel. The thread from the bobbin passes through an eye in the end of a short adjustable arm, and thence to an eye in the extremity of an auxiliary lever, which is lifted by a pin in the needle slide at each stitch, and conse-

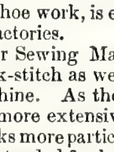
quently takes up the slack of the thread and tightens the stitch. The object of the adjustable arm is to regulate the amount of thread drawn off the bobbin at each stitch in accordance with the thickness of the material operated upon, it being simply requisite to raise or lower this arm slightly when the variation produced in the angle or direction of the thread causes more or less thread to be drawn off the bobbin at each rise of the auxiliary



Thomas' Machine and Shuttle.

lever. This machine, which is well adapted for general outfitting and boot and shoe work, is extensively employed in all the Government factories.

The Grover and Baker Sewing Machine Company construct a new form of lock-stitch as well as a "knotted" or double chain-stitch machine. As the latter description of machine has obtained a more extensive sale in this country I shall confine my remarks more particularly to this variety. In this machine, when intended for heavy work, a straight needle, having an eye near the point, is carried by a vertical slide, to which an up-and-down motion is imparted by a bell crank lever driven from a cam beneath the table or cloth plate. In the lighter makes, the needle is attached direct to the upper limb of a vibrating lever, and is slightly curved to correspond to the arc described by the end of the lever. A vibrating motion is imparted to this lever by a crank pin working in a slot in the front end of the lower limb of the lever beneath the bed plate. In conjunction with the needle there is a second instrument, called a looper, which may be either straight or of a curvilinear form, and is situate below the cloth plate. The needle and looper are each supplied with a thread direct from ordinary reels or bobbins, and consequently the loss of time incurred in the shuttle machine in winding the thread on to the shuttle spool is obviated. The curvilinear looper is provided with an eye at the



Grover and Baker's Curvilinear Looper.

heel or commencement of the bend, and with a second eye near its point, the part between the two eyes being grooved to receive the thread, which is first passed through the eye at the heel and then through the one at the point. The curvilinear portion of this looper is situate horizontally close under the cloth plate, and a circular reciprocating motion is imparted to it by a segmental rack and pinion, in the heavier class of machines, or by means of a driver having an up-and-down motion along a spiral formed on the vertical spindle or axis of the looper, which is a very beautiful and simple contrivance for the purpose.

The object of the curvilinear shape of the looper is to ensure the presentation of the loop of the under thread in an expanded or open form to the needle, as upon the due passage of the needle through this loop depends the integrity of the stitch. When the needle descends, it carries a loop of the upper thread through the fabric and through the open loop of the under thread; the looper then makes a partial revolution in a backward direction, leaving a loop of the under thread round the needle. Before the needle has withdrawn from the fabric again the point of the looper returns, and passes through the loop of the needle thread, which loop has been opened in the meantime to receive it by a partial rise of the needle. The needle then withdraws from the fabric, which is fed forward one stitch whilst the looper remains stationary, presenting an open loop of the under thread in readiness for the next descent of the needle. The fabric is propelled by the four-motion feed already described. As an objection has been raised against this machine on the score of its great consumption of thread from the lower reel, it is but fair to point out that this defect is, to a great extent, counterbalanced by the saving obtained from the fact that an entire reel of thread may be used up without loose ends or waste of any kind, excepting at the commencement and termination of the bobbin. In the ordinary shuttle machines, the shuttle spool is necessarily small, and only contains a comparatively short length of thread, and as it is impossible to use up the full quantity in the shuttle, it follows that a portion is wasted both at the commencement and termination of each shuttle-full. The amount of work produced in a given time by these machines is considerably greater than that obtained by the ordinary reciprocating shuttle machines.

By using a thick under thread, a highly ornamental braiding effect is produced on one side of the work, but as this ridge would be objectionable in ordinary sewing, it is avoided by employing a considerably finer thread than that supplied to the needle. I may mention another variety of this machine known as the "Boudoir" machine. It was introduced into this country by Newton Wilson and Co., in 1858, and is specially manufactured for family use only, for which it is admirably adapted. The looper is straight, its loop being opened by a special instrument, and the cloth is propelled by a top feed, having a to-and-fro movement only. This machine may be driven in *either* direction without interfering with its operation. It is, I believe, the first introduced here driven by friction alone, no

driving strap being used. There are several sewing machines, chiefly of British manufacture but of American origin, which, although perhaps not so well known as the varieties before us, are, nevertheless, deserving of some notice; amongst these, I may mention the "British Sewing Machine" (a variety of the Wheeler and Wilson machine); the reciprocating shuttle machines of Guinness, Mackenzie, and Simpson; the "knot stitch" machine of Salisbury (producing a lock stitch with twisted loop); and the double chain, or "knotted stitch" machine of Whight and Mann, the leading peculiarity of which is the feeding or propelling of the cloth by a lateral movement of the needle. The French shuttle machines of Callebaut (mostly modifications of, and improvements on Singer's), attracted considerable attention at the International Exhibition last year. To give a description of these machines would occupy too much of your time. All sewing machines are furnished with special appliances for hemming, binding, braiding, tucking, &c.; indeed, there are only two operations they cannot perform satisfactorily, viz:—sewing on buttons and stitching button-holes. A thoroughly practical button-hole machine is much wanted, and would be a fortune to the lucky proprietor.

For a period of five or six years after Howe obtained his original patent, considerable difficulty was experienced in introducing the sewing machine; and it was not until 1851-2 that the sewing machine business can be said to have fairly commenced. In this country and on the Continent, it is, comparatively speaking, even now in its infancy, and no accurate statistical data can be obtained. By bringing to your notice, however, the vast extent of the sewing machine business in the United States, the value of the work done, and the saving of labour effected there, you will be in a position to form some estimate of what the sewing machine is capable of achieving in our own country. In America the number of machines at present in use is estimated at about 300,000, whilst in Great Britain and Ireland, with a considerably larger population, there are probably not more than from 50,000 to 60,000 at work. In America, the manufacture of sewing machines is carried on chiefly by Joint Stock Companies, provided with ample capital and large establishments, where the various parts of the machines are constructed by self-acting tools, thus effecting not only considerable economy in labour, but ensuring an accuracy of workmanship, and beauty of finish, which has never been equalled by our own manufacturers. The amount of capital invested in this business is computed at half a million sterling.

Some of these manufacturing companies employ as many as 500 men, and produce from 300 to 800 machines per week. With us the trade is entirely in the hands of private makers, and contractors, most of whom are in a very small way of business, and £5,000 would be a liberal estimate of the capital invested in plant. There are not more than 12 manufacturing establishments here of any note, and about 100 small workshops, employing two or three mechanics each, the aggregate number of hands engaged in this business being estimated at 500. During the last two years about 20,000 machines have been manufactured in this country, which is little more than one-half the number manufactured by the Wheeler and Wilson Sewing Machine Company alone, in 1860.

The returns of the aggregate annual sales of sewing machines in America, from 1853 to 1859 inclusive, exhibit the rapid growth of this business during the period in question.

Machines sold in	1853	2,509
,, ,,	1854	4,469
,, ,,	1855	3,513
,, ,,	1856	7,223
,, ,,	1857	12,713
,, ,,	1858	17,589
,, ,,	1859	46,243

The superintendent of the census, in his preliminary report to the Secretary of the Interior and Congress on the eighth census, says, "The sewing machine has also been improved and introduced in the last ten years to an extent which has made it altogether a revolutionary instrument. It has opened avenues to profitable and healthful industry for thousands of industrious females, to whom the labours of the needle had become wholly unremunerative and injurious in their effects. Like all automatic powers, it has enhanced the comforts of every class, by cheapening the process of manufacture of numerous articles of prime necessity, without permanently subtracting from the average means of support of any portion of the community. It has added a positive increment to the permanent wealth of the country, by creating larger and more varied applications of capital and skill in the several branches to which it is auxiliary.

"The manufacture of the machines has itself become one of considerable magnitude, and has received a remarkable impulse since 1850. The returns show an aggregate of 116,330 made in nine states in 1860, the value of which was 5,605,345 dols. A single establishment in Connecticut manufactured machines to the value of over 2,700,000 dols., or nearly one half of the whole production of that year. During the year 1861 sewing machines to the value of over 61,000 dols. were exported to foreign countries. It is already employed in a great variety of operations and upon different materials, and is rapidly becoming an indispensable and general appendage to the household.

"Among the branches of industry which have been signally promoted by the introduction of the sewing machine is the manufacture of men's and women's clothing for sale, which has heretofore ranked with the cotton manufactures in the number of hands—two-thirds of them females—and the cost of labour employed. The increase of this manufacture has been general throughout the Union, and in the four cities of New York, Philadelphia, Cincinnati, and Boston, amounted in value to nearly forty and one quarter millions of dollars, or over 83 per cent. of the produce of the whole Union in 1850. The manufacture of shirts and collars, of ladies' cloaks and mantillas—a new branch which has received its principal impulse within the last ten years—and of ladies' and gentlemen's furnishing goods generally, form very large items in the general aggregate of this branch. They severally employ extensive and numerous establishments—many of them in our large cities—with heavy capital. In Troy, New York, the value of shirt collars alone annually manufactured is nearly 800,000 dols., approximating in value to the product of the numerous and extensive iron foundries which have been a source of wealth to that city."

I will now invite your attention to the saving of labour effected by the sewing machine in some of the various departments of manufacture into which it has been introduced in America. (See Tables, next page.) It has been proved, by actual experiment, that one machine will perform the work of at least five seamstresses (in some trades it will do considerably more); allowing one hand to operate the machine, a saving is effected of the wages of the other four. In America, the pay of a needlewoman averages 50 cents a day, consequently we have a clear saving of two dollars a day per machine in wages only.

In the manufacture of ready-made clothing, the estimated saving, in the city of New York alone, is 7,500,000 dollars per annum. In the manufacture of shirt-fronts, which is a distinct branch and carried on to a considerable extent, one machine will produce nearly 100 shirt-fronts per diem, while a seamstress cannot stitch more than six in the same time. In this branch, the saving in New York is estimated at 843,750 dollars per annum.

The manufacture of shirts is another very extensive business, distinct in itself. A single establishment, in New Haven, employs 400 machines, producing 800 dozen shirts per week. The saving in labour, to this house, has been estimated at 240,000 dollars per annum.

In Massachusetts the sewing machine is largely em-

Sewing Machines produced in the United States during the Year ending June 1st, 1860.

STATES.	Capital invested in real and personal estate in the business.	Value of Raw Material, including fuel.	Average Number of Hands employed.		Cost of Labour.	Number of Machines.	Value.
			Male.	Female.			
	Dollars.	Dollars.			Dollars.		Dollars.
New Hampshire	20,350	25,160	97	...	39,540	6,000	134,500
Vermont	25,000	8,320	40	...	19,200	3,500	42,000
Massachusetts	253,000	61,171	509	8	244,560	21,400	1,067,300
Rhode Island	35,000	6,745	60	...	21,600	6,000	90,000
Connecticut	420,000	162,450	679	...	443,400	39,268	2,784,600
New York	368,200	212,440	412	...	132,720	27,230	1,043,805
Pennsylvania	212,500	52,598	240	20	115,440	5,149	249,355
Ohio	46,200	36,072	114	...	40,776	7,283	178,785
Delaware	10,000	2,875	15	...	6,000	500	15,000
Aggregate	1,390,250	567,831	2,166	28	1,063,236	116,330	5,605,345

Clothing made in the following States during the Year ending June 1st, 1860.

STATES.	Number of Establishments.	Capital invested in real and personal estate in the business.	Raw Material used, including fuel.	Average Number of Hands employed.		Annual Cost of Labour.	Annual Products.	
				Male.	Female.		Value in 1850.	Value in 1860.
		Dollars.	Dollars.			Dollars.	Dollars.	Dollars.
Maine	93	352,750	940,709	258	2,218	359,324	917,311	1,632,946
New Hampshire	67	144,180	334,589	136	1,046	212,664	616,233	669,044
Vermont	39	72,100	131,899	83	239	68,832	124,560	250,669
Massachusetts	194	1,303,100	4,084,771	1,503	3,180	1,134,400	8,757,156	6,440,671
Rhode Island	65	316,700	604,831	398	970	268,260	422,372	1,138,086
Connecticut	57	337,000	782,105	406	1,085	275,604	1,519,433	1,338,985
New York	842	8,028,811	14,341,094	14,576	17,732	6,265,015	16,007,534	24,969,852
Pennsylvania	667	5,325,088	6,244,185	7,776	10,152	2,911,612	6,988,498	12,192,603
New Jersey	137	1,592,775	2,232,145	2,224	4,922	1,164,854	2,484,594	3,975,436
Delaware	20	69,675	102,208	64	167	46,176	83,602	179,840
Maryland	148	1,266,150	1,909,676	2,233	3,779	931,056	2,694,377	3,256,716
District of Columbia	34	125,150	191,668	150	177	91,860	297,900	342,798
Ohio	436	3,021,221	4,339,684	6,348	6,848	2,264,352	2,765,232	8,615,329
Aggregate in 12 States & District of Columbia	2,799	21,954,700	36,239,564	36,155	52,515	15,994,009	43,678,802	65,002,975

ployed in the boot and shoe trade, and its savings are estimated at 7,500,000 dollars per annum.

Of the 300,000 machines in use in America, about 75,000 are employed in private families for domestic sewing; and if we allow thirty days' work in the year to each of these family machines, we have for result a sum of upwards of £900,000, as representing the wages saved in this class of work alone, supposing it to have been done by paid hand labour.

The aggregate annual saving to the United States effected by the sewing machines, with the present number in use, is upwards of £29,000,000; or, in other words, if the whole of the machine sewing now produced in America were to be performed by hand, it would require a sum of upwards of £29,000,000 per annum to pay for the extra labour which would have to be employed.

Although the sewing machine was in practical operation in this country before it had been thoroughly recognised in America, it has received no radical improvement at our hands, all the most important improvements being due to American inventors. Its general introduction here was greatly impeded by the refusal of one of our first patentees to grant licences to make or sell American machines, which by many are preferred to those of English manufacture. Had a more liberal policy been pursued, and licenses granted to all comers at a reasonable rate (which course has been adopted from the first by Howe in America), the sale of machine would have been quadrupled, endless law proceedings avoided, and the profits to the patentee greatly enhanced. In 1860 the patent in question expired, and the public have since then enjoyed the privilege of selecting those machines best adapted to their special requirements, the majority of which are of American manufacture. From these few facts it will be seen that the real trade in sewing machines has only existed here since 1860, which fully accounts for the backward state in which we find it. The sewing machine is now beginning to make its way in various departments of manufacture in this country, whilst a steady increase in the demand for family machines is also showing itself.

Amongst the leading branches of industry which are giving employment to these machines, I may mention the manufacture of shirts, collars, stays, mantles, dresses, under clothing of all kinds, coats, trousers, caps, trimmings, and boots and shoes. In this last-mentioned trade upwards of 3,000 machines are now employed. Of these about 800 are working in Staffordshire, the town of Stafford alone employing from 450 to 500 machines. About 800 are in use in Northampton. In Leicester a trade entirely new to the town has been created through the instrumentality of the sewing machine, about 300 machines being now employed there in the manufacture of boots and shoes. Bristol employs about 250 machines, distri-

buted among five establishments. The towns of Norwich and Ipswich employ about 800 machines, and a new trade in "ready-made uppers" has been created.

Although the introduction of the sewing machine into the boot and shoe trade met with the strenuous opposition of the Trade Union, resulting in a general strike amongst the workpeople, it has since been admitted that its employment in this department of manufacture has given a very marked impulse to the trade generally, and has, in fact, been the salvation to this country of the lighter class of work, enabling us to compete in a most successful manner with the French manufacturers, who had almost gained the entire monopoly of this branch of the trade. It is largely employed by army contractors, both at home and abroad, the clothing of many regiments being entirely made by the sewing machine; indeed, without its assistance, the immense armies which have been lately raised in the Northern and Southern States of America could never have been equipped and sent into the field in the surprisingly short time they were. But the sewing machine has fulfilled a nobler mission in ameliorating the condition of the seamstress by shortening her hours of labour and increasing considerably her earnings. It has called forth new industries in the manufactures of sewing machine needles and of silk twist, both of which are now carried on, to a very considerable extent, as special branches of manufacture, whilst the trades of japanning and plating have been greatly benefited by its agency.

The following noteworthy example of what may be effected by the sewing machine in assisting indigent females, is extracted from a paper read last December by Mr. Seton, advocate, before the Society for the Employment of Women, Edinburgh. The author, after describing the nature of a certain charitable society called the "Register of Benevolence," which receives miscellaneous contributions of clothing, furniture, books, &c., to be supplied to those deserving objects of charity who are diligently, but not always successfully, striving to help themselves, says—"One instance may be given of the way in which other things are made available. Last summer a lady who possessed, but did not use, a sewing machine, offered it to us if it would be of service to any one. It was accepted, as most things are, without knowing what might become of it. Not long after it was applied for, and sent to some ladies in the north, in order that they might ascertain what use a poor girl would make of it before they provided her with one. She had it for six months, and worked it with such success as to support both herself and her mother by her labours. The machine was returned to us a few weeks since, and has now gone to the borders of England on a similar errand." The system of lending sewing machines, either gratuitously or at a nominal rental, is, I think, well worth the consideration of some of our Benevolent Societies, and might possibly be carried out with advantage amongst our suffering sisters in Lancashire, thus making an American invention the means of alleviating the distress occasioned by the derangement of American commerce.

In conclusion, I beg to express my acknowledgments to those gentlemen who have supplied the sewing machines this evening, and to thank them cordially for much valuable information afforded me during the preparation of this paper.

DISCUSSION.

Mr. Benjamin Fothergill (responding to the invitation of the Chairman) said he had come quite unprepared to make any observations upon this interesting and important subject; but having had at an early period of his life something to do with Heilmann's embroidering machines, a great many of which had been in operation for a number of years in Manchester, he could speak as to their success, and could also make some observations with regard to the improvements introduced from time to time into that class of machine. As, however, these were not, properly speaking, sewing machines, he would make no further allusion to them except to remark, that although the needle with the eye in the centre was long known to those connected with the embroidery business, yet they did not appear to appreciate its general applicability. Mr. Alexander had truly said, time would not permit them to go into all the details of the various machines; suffice it to say, with regard to the embroidering machine, that a large number of needles were employed; that there was a wide frame, on which the fabric was stretched, and two travelling carriages, one on each side of the fabric, carrying a number of instruments forming artificial fingers and thumbs, which caught the needles as they passed through, and these being put in motion by the machinery, the pattern required was produced.* With regard to the history of the sewing machine, perhaps Mr. Alexander might not be aware that the Fisher and Gibbons' machine was not only applied to purposes of embroidery, but that it was modified into what Mr. Fisher called a sewing machine. He had a frame, upon which was stretched a couple of pieces of cloth, and the design required to be produced was worked on the fabric in a similar manner to Heilmann's machine. The curved needle, which had been shown to them this evening, perforated the material, a "shogging" motion being imparted to it, so that it might pass easily through. Having described the peculiar action of this machine, Mr. Fothergill went on to remark that three or four years ago, in an action for infringement of patent, Fisher and Gibbons' machine was brought into court as a specimen of the needle and shuttle-sewing, and was worked in the court as a sewing machine. It was at the same time stated in evidence, that when Mr. Fisher had nearly completed his contrivance one or two of his workmen left him, and went to America, and communicated there the idea that was afterwards worked out in the shape of a sewing machine. But whether that was so or not, such was the evidence given before the court on the occasion he referred to, and with regard to Thomas's machine certain portions of the specification were disclaimed because it was demonstrated that Fisher and Gibbons' machine contained many of the same elements. In going through the history of this invention there were various contrivances which, if time permitted, he would have prepared himself to have explained more in detail. He had been appointed one of the jurors in the section which included sewing machines, in the Great Exhibition of last year, but on the second day of his labours he unfortunately met with an accident which prevented his further prosecution of those duties; he would otherwise have been able to have referred more definitely to the points of the various machines exhibited on that occasion. He could, however, confirm the statement made by Mr. Alexander that the admirable contrivance which they saw in the four-motion feed, was one of the results which arose from the difficulty which was at first experienced through the puckering of the material. Mr. Fothergill having given further explanations of the operation of this feed-motion, said he hoped the few remarks he had offered would open the way for the various gentlemen present describing the different contrivances they had introduced in their machines; for he had no doubt each would consider his own machine the best.

Mr. Hodge expressed his regret that greater prominence had not been given in the paper to the name of the late Walter Hunt. He gave Mr. Alexander the highest credit for the critical manner in which he had investigated the sewing machine, and it must be admitted that it was an extremely difficult subject to deal with, and one which required much labour to understand thoroughly. He was anxious to have an opportunity of stating that in 1834 Walter Hunt produced a perfect sewing machine, but, like most inventors, being a poor man himself, he entered into partnership with an individual who was to supply the

* See *Journal*, Vol. vii., p. 318.

necessary capital for bringing out his invention, and the result was that Hunt got into difficulties with his monied partner, a law suit took place, and it ended in Hunt locking up his ideas and knocking his machine to pieces. He subsequently went on inventing various kinds of machinery, and his memory was much revered in the United States. He merely referred to these facts to show that Walter Hunt did produce a sewing machine, but it was with two needles, whilst Fisher and Gibbons were the first to produce a machine with the needle and shuttle. He knew Elias Howe very well, and thought he had been hardly dealt with. He felt ashamed that Englishmen should have so oppressed a man who came to this country with a clever machine, which was, at all events, an important step gained in the desired direction. It was seldom, if ever, that any one man made a perfect machine as a whole. It was done by degrees, and sometimes generations passed away before the perfect machine was produced, but each individual who contributed a step to that end fulfilled his mission. They had great geniuses in this country as mechanicians, as well as in America. Having lived for fifteen years in the United States, he had made himself acquainted with both sides of the question, and he had formed his own opinion as to the reason that invention made greater progress in America than in this country. The *Journal of the Society of Arts*, *Newton's Journal*, and every publication upon scientific matters, were to be found upon the table of every scientific institution in America; and he fully subscribed to the statement which was made thirty-seven years ago, by Dr. Birkbeck, before the London Mechanics' Institution—that the American juniors were treading on the heels of the English seniors, and it was that statement which made him (Mr. Hodge) go to the United States. He was not sure that Howe did not get his first ideas from the beautiful drawings of Fisher and Gibbons' machine that were given in *Newton's Journal*, and it might be that that acute American, seeing that this embroidering machine could work patterns upon the surface of the fabric, thought it might be made applicable to the sewing of garments together. He thereupon introduced the feed motion, and brought his machine to this country. It was not perfect, but it was only fair to give him credit for what he really did. He had since perfected his invention, and a wonderful machine it was. He looked upon the many contributors to the improvement of these various machines as having fulfilled their mission, and to each he would accord the full credit which he deserved.

Mr. Harry Chester would offer a remark, not upon the machine itself, but with regard to the health of the people—particularly the women who used it. No one could doubt that the substitution of work by these machines for the old kind of needlework was a great advantage to the country, and particularly with reference to the health of needlewomen; but it seemed to him that some improvement was still required, and would probably be made. He thought, from what he had seen of these machines, that the persons working at them must assume a stooping position, by which the spine was bent and the chest contracted, and that seemed to be the case with those accustomed to the use of the machine as well as with beginners. In looking at the subject of industrial pathology, it was very important to consider the position of the body in daily labour. Every shoemaker had a large hole in his chest from supporting the last between his bench and his body; washerwomen had swelled legs from standing constantly at the washing-tub; and he feared that the stooping position which was assumed in working these machines would have a prejudicial effect upon the spines of the operators. A curve was said to be the line of beauty, but no advocate of beauty would think it desirable that the spine of women should be bent forward, and it unfortunately happened that there was often a tendency in the spine to bend sideways also. Whatever they might think of a single curve forward, they certainly would not like to see a zig-zag form of spine in woman. He would call attention to this point with regard to these machines, and would suggest whether the work could be brought nearer to the front of the table, so as to be more under the eye of the worker, and so avoid the stooping position. It was a matter of importance, because there could be no doubt these machines would get more into use. They would not only be used by those who gained their daily bread by them, but if the ladies of London now had a stronger fancy than another it was devotion to the sewing machine, and as ladies did not readily give up anything they took up with zeal and devotion, the probability was these machines would soon be largely in use in the drawing-room as well as in the workshop.

Mr. Hodge said he should have liked Mr. Chester to have been with him in a visit he made at the commencement of the Crimean war, to a poor widow with two children, who took soldiers' coats to make from sub-contractors—no doubt a good many degrees down—at sixpence-halfpenny each, finding her own cotton and candle. Working from five o'clock in the morning till half-past eleven at night, her earnings amounted to sixpence-halfpenny. If the poor creature worked long at that rate she would not only have a hole in her chest, but would disappear altogether, and how little harm, in comparison, would be done by a few hours' work at a sewing machine.

Mr. Fothergill begged to explain that the reason why Fisher and Gibbons' machine was not proceeded with at the time was this—It was adapted to one of the most beautiful kinds of embroidery he had ever seen, viz., the lace falls of ladies' bonnets, which at the time went out of fashion. Mr. Fisher was then only 19 years of age, and being the nephew of Mr. Gibbons, who was the capitalist in the concern, that gentleman refused to advance more money to enable him to carry out his invention. By the death of his uncle, Fisher came into posesssion of funds, but the period had nearly elapsed for which the patent was granted. He, however, determined to make another attempt to introduce his machine, and also to adapt it to sewing. He made two or three machines upon a large scale, and set them to work, and ultimately produced those beautiful falls to which he had referred. He then brought his machine to London and made application to the Privy Council for the prolongation of his patent, but their lordships, considering he had not been an industrious patentee in making his invention of public utility, refused the application. In the first instance, Mr. Fisher being only a youth, had not the means of bringing out his machine, and in addition to that, the fashion for that description of work went out. The result was that he lost a large sum of money from the patent not having been prolonged.

Mr. Brodrick said it seemed to be a misfortune to anyone to profess to write the history of the time in which he lived, and an instance of this was afforded by the remarks of Mr. Fothergill. That gentleman had referred to the machine of Fisher and Gibbons, of Nottingham; he did not know its date. [Mr. Fothergill replied, 1844.] His principal reason for rising was, as an American, to say that if there was one thing which Americans prided themselves upon, it was the invention and perfecting of the sewing machine. Taking the date of Fisher and Gibbons' machine at 1844, it was antedated by that of Walter Hunt, in 1834. He had seen the machine which was rescued from the fire in John-street, New York, and it was subsequently produced as collateral evidence in an important trial of patent rights. The machine which Mr. Fothergill spoke of had a four-motion feed, upon which little stress was laid, but he (Mr. Brodrick) regarded it as the most important feature in the machine. That was the invention of Mr. A. B. Wilson, of the Wheeler and Wilson Sewing Machine Company, and it was Singer who invented the wheel-feed motion, and was the first to apply it successfully to the sewing machine. Any gentleman who had been in Washington must have seen in the

Patent Office there the various sewing machines that had been invented from the year 1834 to 1863, and he was proud to say there was scarcely a year during that period in which some improvement had not been made. The machine which Walter Hunt produced was deficient in not having the holes in the shuttle which were necessary to produce tension upon the lower thread. If he was not mistaken, that was one reason why Howe's machine succeeded so well. They must remember, in the history of all inventions—however great or small—the complete idea did not proceed from one man, and he questioned whether any man ever by himself conceived a scheme which entitled him to be called the original inventor in the strict sense of the term. There were several matters in which Howe claimed to be the inventor. Singer claimed to be the inventor of the appliances in his machine, and Wilson made the same claims with regard to his machine, but as to the forming of the lock stitch with the reciprocating shuttle, he thought there would not be any doubt that Howe succeeded, having taken up the invention where others had left it. He thought, however, the great value of Howe's invention was in the four or five holes in the side of the shuttle for increasing or decreasing the tension upon the thread; but for that there must have been a set screw at the end. In Walter Hunt's machine he thought this was the case. He had examined the matter very closely, and he thought without that invention of Howe's the shuttle must have failed. There was another machine which Mr. Alexander had overlooked, viz., a machine brought out by Bachelor, of New York, and Lerow and Blodgett, of Newark, New Jersey. The disc feed arrangement, with pins projecting so as to catch the fabric, was used in that machine; but previously to that there was no way of spacing the stitches, the plan for which was the invention of Mr. Bachelor, as also the feed-wheel, giving the addition of the screw at the side. He believed the date of that machine was 1848–9. With reference to the remarks which had fallen from Mr. Hodge upon the interest which was taken by American artisans in the scientific publications of the day, he (Mr. Brodrick) would state that there was a publication, known no doubt to many present, called the *Scientific American*, which was exclusively the organ of all information with respect to patented inventions, the specifications of which were accompanied by illustrations. With regard to what had been stated by Mr. Chester as to the injurious effects to be apprehended from the use of the sewing machine in the deformity of the spine, and the hole in the chest, he (Mr. Brodrick) would say that that gentleman was greatly mistaken. An inspection of the machines would show him that working at them for four or five hours would not produce any worse effects upon the spine or chest than the same number of hours' work by an accountant or clerk at a desk, and the height of the table from the floor was such that a person sitting at work on a chair did not require to assume an injuriously stooping posture. They had all at different periods of life been affected by the recital of Hood's "Song of the Shirt," but he was quite sure the workwoman of the sewing machine would bear favourable comparison with the workwoman who gave Hood his inspiration. Any person of ordinary skill could sit at the machine and perform with comfort more work in one hour, and of a better quality, than the best sempstress could accomplish in eight or nine hours. He knew instances of widows in America who had adopted these machines as a means of livelihood, and could, with their families, earn from two to three, and even five guineas per week. He hoped in this country these machines would prove as remunerative to the inventors as they were acceptable to those who used them.

Mr. Mann, following up the remarks that had been made by Mr. Chester, with reference to the influence of these machines on the health, would say that in many of the machines the work passed in front of the operator so close to the eye that there was no necessity for stooping, and a lady might sit at work at the machine as comfortably as in an easy chair. With regard to the objection that these machines were likely to throw a great many persons out of employ, or to lessen the amount of their earnings, there was no question amongst those who were best informed on the subject that, instead of starving sempstresses toiling with their needle for a bare crust, a person of ordinary skill might with the machine earn a comfortable subsistence, with far less physical labour and fatigue. Many single women, working ten hours a day in the City, earned from 12s. to 20s. per week. Not only was the rate of remuneration increased, but the amount of employment was also increased. He knew one firm who, when they commenced business, employed only four hands, but they were now using 60 sewing machines, and employed from 140 to 150 young women, besides a large staff of workmen.

Mr. Salamon would offer one or two remarks upon what had fallen from Mr. Fothergill as to Fisher and Gibbons having been the original inventors of the sewing machine. It raised the important question, whether the machine was, in fact, an English or an American invention. If the patent of Fisher and Gibbons had been prolonged, an enormous fortune would have been secured to those who were interested in it, but the eyes of the Lords of the Privy Counsel failed to recognise them as the inventors. It was only three weeks ago that he had the pleasure of entertaining Mr. Gibbons, and he then put the question to him direct, whether, when his machine was invented, he had any idea of a sewing machine? His reply was, "Not the slightest." He (Mr. Salamon) would say that was conclusive evidence that Fisher and Gibbons did not invent the sewing machine. That which they invented lacked all the essential features of a sewing machine. There was no feeding apparatus, no apparatus for making the tension of the thread, and many of the other appliances were wanting. He would call Mr. Alexander's attention to one or two mis-statements he had made. It so happened that the patent laws of this country legalised brain-theft, and in too many cases the real inventors not only were deprived of all benefit from their inventions, but their names were not even acknowledged or associated with them. Mr. Alexander had mentioned the name of Mr. Morey as the inventor of a sewing machine. The fact was, that gentleman was only a speculator in patents. Mr. Morey went to France, and got into prison at Clichy, where the rule was, that after a certain hour a prisoner might not put his head out of his cell, but as Mr. Morey disobeyed that rule, after having been challenged three times by the sentry, he was shot. To the great credit of the Emperor of the French, it should be stated that he immediately pensioned Mr. Morey's widow with £5,000.

Mr. Brodrick inquired what invention Mr. Morey claimed?

Mr. Salamon replied, the serrated plate, but he was not the inventor of the serrated plate, nor was Mr. Wilson, but the real inventor was Mr. J. H. Johnston. If Mr. Howe was a great inventor, Mr. Johnston was equally great, for without the feed the sewing machine was nothing. To use a poetical figure, Elias Howe constructed the plastic form, and Johnston stepped in and gave the figure life. Mr. Johnston was now reaping the benefit of his invention in America, for although his rights had been only so lately acknowledged, he was allowed to reap the benefit of his invention in that country; but he had not done so in England, because he had not put his £100 into the Patent-office. To give them some idea of the importance of the feed apparatus, he might say he heard Mr. Thomas state, in evidence on the trial of the action "Foxwell *v.* Thomas," that he had paid Mr. Morey £2,500 for a certain share in that feed apparatus, whilst Howe received only £200 for his whole invention. He (M Salamon) therefore objected to the name of Mr. Morey

appearing upon the records of this Society as the inventor of the feed. It was only justice to state that Mr. Johnston was the inventor of it. There were seven machines exhibited before them this evening, and six of the seven were American. He would ask how it was that America almost monopolised the trade in sewing machines? His answer was that it was owing to the operation of the patent laws of this country, which enabled a man to hold a tight and rigid monopoly, and whether he would grant licenses or not was entirely at his own will. During the time that Mr. Thomas held his patent of the sewing machine, no fewer than 250 patents were taken out for so-called improvements, and the whole of that money lay dead in the patent offices, as not a single invention had been brought out. Were they to suppose that those 250 people paid their money for the mere pleasure of doing so? or were they to infer that some one prevented them from working out their inventions? He should like to see an account of the number of licences which Mr. Thomas granted during the time of his monopoly for the manufacture of the shuttle machine. He did not believe there was one, and the consequence was we were beaten by the Americans. In America every patentee was bound to license, but here he might shut up his inventions. There was another remarkable fact—the sewing machine was in use in this country by Mr. Thomas before it was in America. He believed there was no evidence of our mechanics making any improvements in those machines; but in America they found, that besides various improvements, there were virtually new machines produced by Grover and Baker, Wilcox and Gibbs, and Wheeler and Wilson, but our mechanics could not do this. It seemed strange that in this country of mechanical ability, they had not a single sewing machine worthy to compete with those of America. Although himself representing Elias Howe, as an Englishman he should be proud to see his country properly represented in this matter.

The Chairman said it now became his duty to propose a vote of thanks to Mr. Alexander for the interesting and important paper he had read to them—interesting, because he had shown them the result of so much mechanical skill and ingenuity; and important, because of the great economy of labour, and the manner in which the interests of a large number of industries were affected. Mr. Alexander had mentioned various inventors who had contributed to the perfection of this machine, if indeed it could now be considered perfect. There might be still further improvement; in point of fact, they might eventually have a loom which would complete a garment without sewing—like the stocking machine. But the history of these inventors was the history of men of genius who had applied their minds to the economising of labour. They had great conceptions, but they seldom or never perfected those conceptions in the first instance, but, as in all other things, they worked their way, step by step, through great difficulties, frequently not achieving successful results for themselves, although they conferred great benefits upon the public. He thought probably the reason why so many labour-saving machines were produced in America was, that the price of manual labour was so much greater there than in this country—more especially, he believed, the labour of sempstresses. They knew that profit was the great stimulus of invention, and no doubt it was difficult in America to get the necessary supply of labour, and hence the ingenuity of the people was devoted to the invention of machinery as a substitute for it. It was also to be remarked that the working people in America were more highly educated than were the same class in this country, and they had a more ready intelligence in seizing what was brought before them. That, he hoped, was an inequality which would not exist much longer. The mode in which Mr. Alexander had described the various sewing machines had made that which appeared extremely technical and difficult quite intelligible to anyone. No doubt when they saw a sewing machine at work it was difficult to comprehend, but when explained in the way Mr. Alexander had explained it, it became easily understood. It was remarkable that most really useful machines were, when properly understood, perfectly simple, for that which was complex had seldom been a mechanical success. He was quite sure they would agree in passing a cordial vote of thanks to Mr. Alexander for his valuable paper.

The vote of thanks having been passed,

Mr. Alexander, in reply upon the discussion, said that Walter Hunt had not that tension-appliance in his shuttle which was necessary for making a light stitch; and that, although Hunt had every opportunity afforded him of stating his case before the American judges, both in law and equity, judgment was given in favour of Howe, in all cases, he believed. If Hunt's was a really practical sewing machine, how came it that it lay dormant for fifteen years? Why was it never brought out? In answer to Mr. Fothergill's remarks on Fisher and Gibbons' machine, he (Mr. Alexander) stated that Fisher and Gibbons did not construct a really practical sewing machine, as such, before Howe; they never contemplated the construction of a *sewing* machine, although they might have produced some sewing by their machines at a later date. The machines, as specified by them lacked most of the requirements necessary to a sewing machine. In reply to Mr. Mann, he begged to state that his observation, that Bishop was the prior inventor, had reference only to the system of feeding the cloth by a lateral movement of the needle, and not to the arrangement of the machine, for which he gave Mr. Mann full credit as the inventor.

Mr. Fothergill said he himself saw a machine constructed according to Fisher and Gibbons' patent, and it sewed most effectually.

Mr. Alexander inquired when that was? He understood they reconstructed the machine and made it a sewing machine.

Mr. Fothergill could not state the date, but he had seen the machine at work.

The sewing machines of Messrs. Willcox and Gibbs, Wheeler and Wilson, Howe, Singer, Thomas, and Grover and Baker (Newton, Wilson, and Co.), as well as Messrs. Newton, Wilson, and Co.'s boudoir machine, were, by the kind permission of the proprietors, shown in operation during the evening. A model of the original sewing machine, as invented by Howe, was also on the table, having been kindly lent from the Museum of the Commissioners of Patents by Mr. Bennet Woodcroft, F.R.S. The woodcuts used to illustrate the paper were kindly lent by the proprietors of the *Practical Mechanics' Journal Record of the International Exhibition of* 1862.

The Secretary announced that on Wednesday evening next, the 15th inst., a paper by Mr. George Wallis, "On the New Art of Auto-Typography," would be read.

Home Correspondence.

FIRE-ENGINES.

Sir,—A copy of the *Journal of the Society of Arts*, of March 20th, 1863, having been handed to me, I perceive in the same a tabular statement of the actual results of the steam fire engines handed in by Mr. King, in connection with his paper on the "Suppression and Extinction of Fires." The digest of that table, I find, Mr. King has extracted from my official report of fires attended by Mr.

Hodge's Fire Brigade, during 1862 (a copy of which I beg to forward you), but he has perverted the actual truth of those trials—he has added 10 feet extra on the results of Easton and Amos's engine, and subtracted from the other makers' engines. I, therefore, beg to enclose you the truthful results of those trials, which materially alter his statement; and, in justice to the makers, I trust you will insert the same, with this letter of explanation, in your next number. I may add, that the results, as they appear, in my report, form which the enclosed table is an extract were submitted to the various makers and to many scientific gentlemen who were present at the trials, in order that they should be considered "facts." No other trials of the three makers' engines combined have taken place at any other place than Mr. Hodges' distillery; therefore, Mr. King's statement must be erroneous.

I am, &c.,

LEWIS M. BECKER, Lieut. H.F.B.

20, Pratt-street, Lambeth, April 4, 1863.

TABLE OF RESULTS OF TRIALS OF STEAM FIRE ENGINES, AT HODGES' DISTILLERY, DURING 1862.

Engine Makers' Name.	Steam Pressure.	Vertical Heights.	Size of Jets.	Horizontal Distances.	Size of Jets.	Average water pressure.	Steam pressure of 50 lbs. in minutes.
	Lbs.	Feet.	In.	Feet.	In.	Lbs.	m. sec.
Easton, Amos, and Sons.........	120	165	1¼	197	1½	140	11 30
	140	150	1½	190	1⅝		
Merryweather & Son	140	170	1¼	220	1¼	160	9 50
		165	1⅜	210	1⅜		
		155	1½	194	1½		
Shand and Mason	120	174	1½	187	⅞	140	14 0
				196	1		
				190	1¼		

STREET ILLUMINATIONS.

SIR,—Your correspondent Mr. H. C. White, in his letter inserted in your last *Journal*, (page 355), appears to regret, but without sufficient cause, that this subject has been noticed by the Society and a committee appointed for its consideration. Illuminations for joyful events are an old-fashioned custom followed out in old-fashioned ways, but that is no reason why they should be extinguished, or that they should not be carried out in a manner rather more in accordance with the progress of the age.

Mr. White complains of their causing over-much license and disorder, but so does every other assemblage of multitudes on joyful or other occasions, though the mode in which illuminations have been hitherto got up is not calculated to produce handsome general effects, as well as that avoidance of concentrated crowds in certain places for which the disgracefully narrow and crooked thoroughfares of our great metropolis, the richest in the world, are so very ill suited.

It is not in many parts of London that illuminations of private or public buildings, however splendid, can be seen to advantage, on account of the narrow streets in which they may happen to be placed. For example, the Cathedral of St. Paul's, with the exception of the dome and lantern, cannot be seen to advantage, from the total absence of clear space arround it; and the *façade* of Goldsmiths' Hall cannot be seen at all without lying down on your back in the opposite gutter, not twenty feet from the base of the building. There are few places—and none in the City—like Trafalgar-square, where illuminations such as that of the National Gallery can be seen so advantageously, especially if that eyesore, the Nelson Column, were not there, an object that always puts me in mind of those horrid fanatics of the dark ages, the Stylites, or pillar saints.

Partial illuminations, regulated only by the caprice of isolated individuals or companies, can never produce a grand general and pleasing effect, or be free from causing the accumulation of excessive crowds at certain spots; but if, when a general illumination was intended, a general subscription were entered into really to illuminate the great thoroughfares of the metropolis by means of festoons of gas lights, or any other uniform or varied device, the expense would be very much lessened, and no overcrowding would take place at any one spot, while a splendid promenade would be afforded to all those who might wish to walk or ride through the brilliantly lighted thoroughfares.

I throw out these crude suggestions merely with the view of eliciting something better from any of your correspondents who may have a fancy to take up this subject. I am, &c.,

HENRY W. REVELEY.

Reading.

MEETINGS FOR THE ENSUING WEEK.

MON. ...R. Geographical, 8½. 1. Captain C. F. Hall, "Frobischer Strait proved to be a Bay, and on the fate of five men of the Arctic Expedition in the reign of Elizabeth." 2. Dr. Jno. Rae, "A Visit to Red River and the Saskatchewan."
Medical, 8½. Mr. Gay, "On Intestinal Stricture."

TUES. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. 1. Discussion upon Mr. Miller's paper on "Structures in the Sea." 2. Mr. John Brunton, "Description of the Line and Works on the Scinde Railway."
Syro-Egyptian, 7. Annual General Meeting.
Ethnological, 8. Mr. John Crawfurd, "On the Antiquity of Man."
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."

WED. ...Society of Arts, 8. Mr. George Wallis, "On the New Art of Auto-Typography."
R. Soc. Literature, 8½.
Royal Horticultural. Azalea and Rose Show, 1. Floral Committee, 10. Fruit Committee, 10.

THURS...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8.
Chemical, 8. Messrs. W. H. Perkins and A. H. Church, "On Derivatives of Naphthylamine."
Numismatic, 7.
Royal Soc. Club, 6.
Royal Inst., 3. Prof. Ansted, "On Geology."

FRI.......Philological, 8.
Royal Inst., 8. Mr. Frank Buckland, "On the Culture of Fish."
R. United Service Inst., 3. Mr. G. R. Burnell, "On the Progress of Naval Science during the year 1862."

SAT.......Royal Inst., 3. Professor Max Muller, "On the Science of Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 3rd*, 1863.]

Dated 20th February, 1863.

468. W. Clark, 53, Chancery-lane—Imp. in projectiles for ordnance. (A com.)

Dated 27th February, 1863.

551. H. Fehr, 63, Fenchurch-street — Imp. in the treatment of mineral oils.

Dated 5th March, 1863.

629. J. Elsey, Nottingham—Improved apparatus for the winding of lace on to the work roller in warp lace, bobbin net, or twist lace machines.

Dated 9th March, 1863.

645. H. Whittles, Milnrow, Lancashire—Imp. in machinery or apparatus for collecting the condensed steam or waste water from places where steam is used, and returning the same to the boiler.
647. J. Cowley, Oxford—Imp. in machinery or apparatus for manufacturing bricks, tiles, pipes, and mouldings.
649. J. Isherwood, Sharples, near Bolton, Lancashire—Imp. in working presses for making up yarn in bundles.
651. C. H. Lea, Shallowford, near Stone, Staffordshire—Improved apparatus for opening and closing the gates of railway crossings, which apparatus also acts simultaneously upon the signals.
553. P. Hugon, 56, Rue de l'Ouest, Paris, France—Improved machinery for obtaining and applying motive power.
657. W. E. Newton, 66, Chancery-lane—Imp. in the construction or laying of wooden floors. (A com.)

Dated 11th March, 1863.

661. F. Cooke, Denton, Lancashire—Certain imp. in the manufacture of hats or coverings for the head.

663. J. Cassell, La Belle Sauvage-yard—Imp. in moderator lamps to adapt them to the burning of petroleum and other mineral oils and hydro-carbons. (A com.)
665. W. R. Mulley, Plymouth—Imp. in sheathing iron ships, caissons, and other like structures.
671. J. Tomlinson, Rochdale—Imp. in machinery for opening twisted yarns and woven fabrics.
673. W. Rossetter, Accrington, Lancashire—Imp. in back beam warping machines.

Dated 12th March, 1863.

675. H. D. Taylor and J. W. Taylor, Huddersfield—Imp. in finishing woollen, worsted, and other fabrics, and in machinery or apparatus to be used therein.
676. L. Desens, Paris—An improved bath or bathing machine adapted for deep water.
677. W. Clark, 53, Chancery-lane—Imp. in breech-loading fire-arms. (A com.)
679. J. Polkinghorne, Redruth, Cornwall—Imp. in treating tin ores and in apparatus for treating ores and matters containing arsenic.

Dated 13th March, 1863.

681. J. Harris and J. Butler, Pontypool, and J. H. Fraser, Llanvrechva Upper, Monmouthshire—Imp. in machinery for rolling armour plates, bridge plates, boat plates, and other plates and bars of iron.
683. J. Taylor, Burnley, Lancashire—Imp. in fire bars and bearers.
685. W. H. Stubbe, New York, U.S.—Imp. in governors for marine and other engines.
687. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in fastenings suitable for portions of harness and other purposes. (A com.)

Dated 14th March, 1863.

689. W. E. Gedge, 11, Wellington-street, Strand—An improved plough. (A com.)
691. W. West, Tredenham-house, St. Blazey, Cornwall—Imp. in valves.
693. J. W. McCarter, Londonderry—Imp. in machinery for sawing or cutting wood.
699. J. Walworth, Bradford—Imp. in machinery or apparatus for washing or cleansing and drying Egyptian wheat, beans, and other kinds of grain or seeds.

Dated 16th March, 1863.

701. E. Oliver and G. Myers, Rotherham, Yorkshire—Imp. in apparatus for lowering and disengaging boats from vessels.
702. F. Hoyos, Paris—An improved stove or fire grate for heating, cooking, boiling, or other similar purposes.
703. T. W. Willett, 31, Charing-cross—Imp. in means for reefing and furling square sails of ships and vessels from the decks thereof.
705. G. P. Beley, Liverpool—Imp. in discharging projectiles below the water line of navigable vessels and other structures.
709. W. G. Eavestaff, Great Russell-street—Imp. in the construction of pianofortes.

Dated 17th March, 1863.

713. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the mode or means for framing pictures, looking glasses, and other objects. (A com.)
714. W. H. Emett, 8, St. George's-terrace, South Kensington—Imp. in processes for facilitating and combining the art of writing with engraving together on stone, applicable to maps, plans, specifications, and other lithography, which improvements are also available for retransfers to zinc or stone, or printing from original.
717. G. De Laire, Paris—Imp in the manufacture of brown colouring matters. (Partly a com.)

Dated 18th March, 1863.

719. W. Symington, Market Harborough, Leicestershire—Imp. in the process of, and apparatus used in, roasting and treating coffee and other organic substances.
720. W. C. Wild and J. H. Randel, Birmingham—A new and improved mode of inlaying gold and other metals in glass, and in a composition suitable for the manufacture of jewellery and other ornaments, buttons, and other similar articles.
721. W. Donbavand and D. Crichton, Manchester—Imp. in looms for weaving.
722. J. Roberts, and R. Naylor, Manchester—Imp. in organs, harmoniums, and pianofortes.
723. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of spoons and forks. (A com.)
725. W. E. Taylor, Enfield, near Accrington, Lancashire—Certain imp. in machinery for reeling, winding, warping, and beaming yarn.
729. T. Oldknow, Ashforth's Factory, Nottingham—Imp. in the construction of jacquards employed in bobbin net or twist lace machines.
732. A. Morel, Rue du Marche, Brussels—Imp. in apparatus for generating carbonic acid.
733. J. D. Welch and A. P. Welch, Gutter-lane, Luton, Bedfordshire—Imp. in bleaching and in reducing and brightening the colour or tone of dyed straw plaits and straw.

Dated 19th March, 1863.

735. E. Lever, Manchester—An improved composition for the coating and preservation of canvas and other materials to make them waterproof and non-inflammable.
741. G. H. Smith, Ipswich—Imp. in sewing machines.

Dated 20th March, 1863.

744. A. Barclay and A. Morton, Kilmarnock, Ayr, N.B.—Imp. in certain apparatus fer injecting and ejecting fluids.
745. J. Nield and T. A. Nield, Dukinfield, Cheshire—Imp. in core barrels.
746. R. A. Brooman, 166, Fleet-street—Imp. in machinery for beating and drying wool and other textile and filamentous substances. (A com.)
748. G. Wilson, Sheffield—An imp. in the manufacture of springs.
749. G. Coles, Gresham-street-west, and J. A. Jaques and J. A. Fanshawe—Imp. in machines or apparatus for washing or wringing clothes or fabrics.
750. C. Pryse and D. Kirkwood, Birmingham—Imp. in breech-loading fire arms, part of which improvements are also applicable to other descriptions of fire arms.
752. F. De Wylde, Trinity-square, Tower-hill—Imp. in the manufacture of cement from gypsum.

Dated 21st March, 1863.

754. F. Roberts and A. Roberts, 5, Victoria-cottages, Barton-terrace, Gloucester—Imp. in agricultural implements, and in apparatus for working the same.
755. C. De Groote, Brussels—Imp. in the construction of lamps with circular burners or wicks for the combustion of petroleum, schist, and other volatile oils, parts of said improvements being applicable to gas burners, night lights, and lamps burning spirits and animal oils.
760. F. Applegate, Bradford-on-Avon—Imp. in time indicators.

Invention with Complete Specification Filed.

786. Lieut. G. T. Key, R.N., Portsmouth—Imp. in fog and other signals.—25th March, 1863.

Patents Sealed.

[*From Gazette, April 7th*, 1863.]

April 6th.

2698. J. Newnam.
2699. T. Beards.
2708. A. Forbes.
2710. H. D. P. Cunningham.
2711. J. K. Hampshire.
2712. J. Beale and M. A. Beale.
2714. C. F. Terry.
2728. A. V. Newton.
2731. L. Hosch.
2733. R. E. Green & J. Cockroft.
2738. D. S. Sutherland.
2739. E. Weallens.
2741. J. J. Shedlock.
2743. A. Vennedy.
2744. R. A. Brooman.
2746. J. Durrant.
2748. A. V. Newton.
2758. J. Gumbley.
2760. E. B. Wilson.
2765. E. Barlow, J. Clough, and F. Hamilton.
2781. C. de Bergue.
2784. J. B. G. M. F. Piret.
2790. W. Barningham.
2808. J. H. Johnson.
2812. J. Bentley.
2817. W. Clark.
2855. W. Clark.
2877. W. Clark.
2894. A. Peek.
2949. W. E. Newton.
2950. F. E. Sickels.
2952. W. Jenkins.
3046. C. Socin.
3166. W. Longley.
3175. A. V. Newton.
3234. G. T. Bousfield.
3483. F. Applegate.
67. L. Hull.
119. G. T. Bousfield.
155. G. T. Bousfield.
208. E. Strangman.
225. F. Tolhausen.
265. J. Mackenzie.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, April 7th*, 1863.]

April 1st.

891. T. Aveling.
921. O. Vandenburgh.

April 2nd.

861. T. Ingram.
896. E. Heywood.

April 4th.

886. J. Hamer.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, April 7th*, 1863.]

April 4th.

842. A. Morton.
843. W. Terry.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4546	March 26.	Malt Screen ...	Alfred Nash ...	Baldock-street, Royston, Herts.
4547	April 8.	An Apparatus for Protecting the Twist on the Stems of Jewellery Pins	R. G. and C. W. Phelps.........	Birmingham.

Journal of the Society of Arts.

FRIDAY, APRIL 17, 1863.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary.*

The subscription of each member is limited to one guinea.

The following additional names have been received up to the 16th inst.:—

Baldry, James Danford	1	1	0
Barton, W. H.	1	1	0
Brown, John William	1	1	0
Brown, Samuel	1	1	0
Burton, Decimus, F.R.S.	1	1	0
Chawner, R. C.	1	1	0
Cox, William Thomas	1	1	0
Crampton, Thomas Russell	1	0	0
Davis, Frederick	1	1	0
Dobson, Benjamin	1	1	0
Edmiston, Charles S.	1	1	0
Fowler, John	1	1	0
Fuller, Francis	1	1	0
Green, Stephen	1	1	0
Hyde, John	0	10	6
Hudson, Alfred	0	10	6
Jackson, John, jun.	1	1	0
Kerr, W. H.	1	1	0
Lawes, Thomas	1	1	0
Martin, Peter, J.P.	1	1	0
Mason, Hugh	1	1	0
Mathews, George	1	1	0
Moffat, Major Augustus Hay	1	1	0
Nightingale, C.	1	1	0
Paget, Capt. Leopold Grimstone, R.A.	1	0	0
Pain, George	0	10	6
Palmer, Philip	1	1	0
Ridley, Arthur S.	1	1	0
Sharples, Joseph	1	1	0
Shaw, Bentley	1	1	0
Simons, George	1	0	0
Smith, J. B., M.P.	1	1	0
Smith, Richard	1	1	0
Solly, Samuel Reynolds, F.R.S.	1	1	0
Somes, Joseph	1	1	0
Sowerby, William	1	1	0
Spence, James	1	1	0
Spink, Daniel	1	1	0
Stone, David H.	1	1	0
Symonds, John	1	1	0
Taylor, William	1	1	0
Towle, John	1	1	0
Tyer, Edward	1	1	0
Vallentin, James	1	1	0
Vaughan, John	1	1	0
Watkins, William	0	10	6
Westley, William	1	1	0
Westmacott, Richard, R.A.	1	1	0
Wheatcroft, Joseph	1	1	0
Williams, John Wrigley	1	1	0
Woodd, Robert B.	1	0	0
York, The Archbishop of	1	1	0

ADDRESSES TO HER MAJESTY AND HIS ROYAL HIGHNESS THE PRINCE OF WALES.

A general meeting of the members of the Society was held on Friday, the 10th instant, at half-past four, p.m., for the purpose of voting addresses to her Majesty the Queen, and his Royal Highness the Prince of Wales, on the marriage of his Royal Highness. W. H. Bodkin, Esq., Assistant-Judge, Vice-President of the Society, took the chair.

The Secretary having read the advertisement convening the meeting,

The Chairman said—Gentlemen, I feel sure that this is not an occasion upon which you will consider it necessary that much time should be occupied in alluding to the happy event which has assembled us together. You will, I think, agree with me that no formal speeches are needed on this occasion; and I feel that I shall best consult the wishes of the meeting by proposing from the chair a resolution which cannot but meet your hearty concurrence, namely, "That addresses of congratulation be presented to her Majesty the Queen and his Royal Highness the Prince of Wales, on the marriage of his Royal Highness." I will call upon the Secretary to read those addresses, and in the event of their meeting with your approbation, the next resolution which will be submitted to you will be that the Council be requested to place the common seal of the Society to those addresses.

The Secretary then read the proposed addresses to Her Majesty and his Royal Highness the Prince of Wales. These will be published in the *Journal* as soon as they have been presented.

The addresses having been unanimously agreed to,

Mr. Harry Chester, Vice-President, said—I beg leave to move, "That the Council be requested to affix the Common Seal of the Society to the addresses now agreed to, and to take the necessary steps for presenting the same to Her Majesty and His Royal Highness the Prince of Wales."

The resolution, having been seconded by Mr. William Hawes, was unanimously adopted.

The Chairman said—I think, gentlemen, although no formal speeches have been made on this occasion, I cannot, in the prominent position which I occupy to-day, allow the meeting to separate without saying one word upon the occasion which has called us together. We have lately seen an exhibition of feeling in this metropolis unequalled, I believe, in any country at any time, of regard and affection for the illustrious lady whom the heir to the throne has selected as his wife. I may be excused for saying that I had an opportunity of seeing that lady on the Continent, having been near her for some hours, and I was charmed, as every one must be, with her appearance and manner, and more than charmed by seeing the strong affection which evidently existed between her and her intended husband. I am sure we shall all gladly unite in the prayer for their happiness, not forgetting one consequence which I hope may result from this union, namely, that it may have the effect of in some degree dispelling the gloom caused by that heavy affliction with which it has pleased Providence to visit the highest person in this realm. I am sure you will all much rejoice if that effect is produced, and I believe there are some symptoms which tend to encourage such a hope. If the Prince of Wales shall, in the course of his future career, justify the expectations that are formed with respect to him, holding, as he is destined to do—we hope at a very distant day—the highest position in Europe—indeed, in the world—we shall not forget how much is due to the example of his parents, and particularly to the training and influence of that illustrious man who so long presided over this Society, and whose loss we shall never cease to deplore. Surely to him may with truth be applied those words which were used with reference to one of England's noblest sons—

> "Those bright laurels ne'er will fade with years,
> Whose leaves are watered by a nation's tears."

The proceedings then terminated.

EIGHTEENTH ORDINARY MEETING.

Wednesday, April 15, 1863.

The Eighteenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 15th inst., Richard Westmacott, Esq., R.A., in the chair.

The following candidates were proposed for election as members of the Society:—

Blore, John	8, Michael's-place, Brompton, S.W.
Bolton, Thomas Henry	14, Thornhill-crescent, N.
Boothby, John L.	18, Notting-hill-square, W.
Chatfield, Frederick	12, Pall-mall, S.W.
Clarke, Joseph, F.S.A.	13, Stratford-place, W.
Clement, John H.	3, Gloucester-terrace, Church-street, Kensington, W.
Freyberg, James	11, Grosvenor-street West, Eaton-square, S.W.
Waters, Robert S.	St. Giles, Dorset.

The following Candidates were balloted for and duly elected members of the Society:—

Allan, William	12, Marquess-villas, Canonbury, N.
Appleby, Samuel	6, Harpur-street, Red Lion-square, W.C.
Battye, Richard F., M.D.	6, Gloucester-street, Belgrave-road, S.W.
Belany, Archibald	37, Clarendon-road, Kensington-park, W.
Bennet, James Lindsay	2, Taviton-street, Gordon-square, W.C.
Catto, John	30, Milner-square, Islington, N., and 50, Upper Thames-street, E.C.
Lloyd, George Alfred	30, John-street, Bedford-row, W.C.
Muirhead, J.	Electric Telegraph Company, Gloucester-road North, Regent's park, N.W.
Parsons, John Meeson	6, Raymond-buildgs., Gray's-inn, W.C.
Puller, Arthur Giles	Athenæum Club, S.W., and 14, Portland-place, W.
Rhodes, Henry	86, Cambridge-street, Pimlico, S.W.

The following Institution has been received into Union since the last announcement:—

Holloway (N.) Literary Institute.

The Paper read was—

THE NEW ART OF AUTO-TYPOGRAPHY.

By George Wallis.

As the new art-process for the re-production of drawings to which I am about to call attention, and as far as possible describe and illustrate before you, is based in principle upon a process of an analogous character, by which certain classes of natural objects are engraved and printed, popularly known as Nature-Printing, I think it desirable, from my personal connection with the two gentlemen who certainly originated the direct method of Nature-Engraving, as I prefer to call it, in this country, and my knowledge of their early efforts, to endeavour briefly to correct a wrong impression which I believe to have been unintentionally given, through an imperfect knowledge of the true facts and the dates at which the first experiments were made in England.

In a paper read at the Royal Institution, 11th May, 1855, by the late Mr. Henry Bradbury, to whose ability, energy, and perseverance, the art of nature-printing owes so much, and also in a more recent publication, the early attempts to obtain impressions from plants, &c., are carefully traced up. In these papers Mr. H. Bradbury gives the credit, which is evidently due, to a Danish goldsmith and engraver, Peter Kyhl, of Copenhagen, as having been the first to produce impressions in metal plates direct from natural objects; but whilst honourably seeking to do

justice to an ingenious man, who unfortunately died in 1833, the year in which he made his invention known, he does a certain measure of injustice to the late Mr. Richard Ford Sturges and Mr. W. C. Aitken, of Birmingham, on the assumption that the experiments made by the former in August, 1851, and the latter in the spring of 1852, were based upon a knowledge of what Peter Kyhl had done. I have no hesitation, therefore, cognisant as I am of nearly all the earlier efforts in this direction at Birmingham, to declare that neither Mr. R. F. Sturges nor Mr. W. C. Aitken knew anything whatever of Kyhl or his experiments, and did not even know that such a person ever existed prior to the publication of the paper read by Mr. Henry Bradbury at the Royal Institution, more than three years after Mr. R. F. Sturges' patent for the ornamentation of metals by pressure, which process he claimed as his invention, had been taken out.

I have felt it my duty to state this, because I purpose bringing out the true dates in connection with the invention of the process of Nature Printing, leading as this process does to that which I am about to describe and illustrate, and of which I claim to be the inventor.

That the Danish goldsmith and engraver, Peter Kyhl, did, in the year 1833, exhibit at the Exhibition of Industry, held at Charlottenberg, various productions in silver, decorated by a process described in a manuscript, entitled "The description (with forty-six plates) of a Method to Copy Flat Objects of Nature and Art," dated 1st May, 1833, and that the plates "represented printed copies of leaves, of linen and woven stuffs, of laces, of feathers of birds, scales of fishes, and even serpent skins," we have the authority of the late Mr. Henry Bradbury, based on that of Professor Thiele, and therefore we may accept it as a fact; but that this fact had anything to do with the experiments instituted at Birmingham, in August, 1851, by Mr. R. F. Sturges, in the engraving of lace, and early in 1852, by Mr. W. C. Aitken, in engraving skeletons of leaves, feathers, &c., by placing the objects between two plates of metal and subjecting them to pressure by steel rolls, I emphatically deny. The truth is, Kyhl's process had been evidently forgotten, and his manuscript, buried in the archives of the library at Copenhagen, was not dug up until the Imperial Printing Establishment at Vienna had given dignity to the process of nature printing, and Mr. Henry Bradbury had brought the invention from Vienna, where it was practised, and, by his skill and ingenuity, had begun to produce the works which are so worthily associated with his name.

The facts are these. In August, 1851, the late Mr. R. F. Sturges made some experiments in direct engraving, by placing pieces of lace between two Britannia metal plates, and passing them through a pair of steel rolls, revolving at a suitable pressure, his object being to devise some cheap and rapid process for the ornamentation of metals. A little specimen in one of the frames before you is an impression printed from one of the plates so engraved at this period. Mr. Sturges took out a patent for "ornamenting metallic surfaces," based upon the results he had arrived at. This patent is dated 24th January, 1852.* Specimens were shown about as curiosities, especially impressions printed from the plates. In assisting to bring this patent into operation, in the establishment of Messrs. R. W. Winfield and Son, Cambridge-street Works, Birmingham, Mr. W. C. Aitken made his first experiment on natural objects with a skeleton leaf, picked out of a roadside brook, early in the spring of 1852. An impression of this, together with one of the two plates, which Mr. Aitken presented to me, are now before you. This result was shown to me in a day or two after it was produced; therefore, I am speaking from experience, and not from hearsay, or upon any authority. Mr. Aitken subsequently brought the further results of his experiments before this Society, in a paper read in February, 1854, and printed in the *Society of Arts Journal*, vol. ii. p. 227.

* Patent No. 13,914.

In Mr. Henry Bradbury's paper, read at the Royal Institution, he says, "In the Imperial Printing Office at Vienna the first application of taking impressions of lace in plates of metal by means of metal rollers, took place in the month of May, 1852. It originated in the Minister of the Interior, Baumgartner, having received specimens from London, which so much attracted the attention of the Chief Director, that he determined to produce others like them." Now we all know what the Imperial Printing Office of Vienna showed in the Great Exhibition of 1851; and, beautiful, and even wonderful, as the specimens were, that there was nothing in any way approaching to nature printing. The Austrian Commission, however, was busily employed in London until the end of 1851 or beginning of 1852. Its members visited Birmingham, as our foreign friends usually do on these occasions, as a relaxation from heavy duties, and from a laudable desire to obtain information.

Mr. R. F. Sturges was not a man to "hide his light under a bushel," and therefore I have little doubt that the specimens of impressions of lace from plates engraved by him were sent to the Austrian Minister of the Interior, being obtained, either directly or indirectly, from Mr. Sturges immediately after he had secured himself in England by patent. If not, where did they come from? No one else in this country had at this period done anything of the kind. Peter Kyhl had been dead and his experiments at Copenhagen forgotten, where alone they had been known eighteen years before.

If we compare the date of Mr. R. F. Sturges' patent, January 24th, 1852, with the date given by Mr. H. Bradbury, May in the same year, as the period of the first experiments at the Imperial Printing Office at Vienna, it will be seen at once that Mr. Sturges had no object in the concealment of his process, or its results, for three months before anything was known or done at Vienna.

In making these remarks, I do so for the honour of Birmingham, and from a strong conviction, based on a personal knowledge of the facts, and not from hearsay, that the action of the Imperial Printing Office at Vienna was induced by the successful experiments made in Birmingham in 1851-2.

Having thus, as an act of justice to an ingenious manufacturer, stated these facts as to the independent re-invention, at least, of this process, assuming Peter Kyhl's to have slept—as it really did—not only from 1833 to 1851, but, in fact, to 1855, when it was brought forward through the instrumentality of Professor Thiele, I may now briefly allude to the several processes employed for the reproduction of flat natural objects by means of metal plates and the printing press: the nature printing of Dr. Dresser by transfer from leaves of plants, &c., to paper direct, and his process of transfer to lithographic stones and printing therefrom, being outside the present question, although very interesting and useful in many points.

In 1847, Dr. Branson, of Sheffield, made a series of experiments, commencing with taking impressions of leaves in gutta percha, from which he cast a brass mould to print from. An electrotype plate could also be obtained. In 1851, Dr. Branson brought this interesting subject and his processes before the Society of Arts.

After the Imperial Printing office at Vienna had experimented upon lace, &c., in 1852, as already mentioned, we have Mr. Henry Bradbury's authority for stating that gutta-percha was tried by Andrew Worring, in whose name the patent was subsequently taken out. No doubt this plan was derived from Dr. Branson. This failing, he, says Mr. Bradbury, "employed," as Peter Kyhl had done before him, "soft lead plates." Yet, probably, Worring was as innocent of any knowledge of Kyhl's doings as Mr. Sturges was. This Mr. H. Bradbury acknowledges with regard to the former, and it is deeply to be regretted that he did not do so in regard to the latter, as I think that Worring, being connected with such an establishment as the Imperial Printing Office at Vienna, was much more

likely to know of the existence of Peter Kyhl's manuscript in the Royal Library at Copenhagen, than a busy manufacturer at Birmingham. Mr. Henry Bradbury's process was taken from that practiced at the Imperial Printing Office at Vienna, where he was engaged for a period, with such improvements as his great ingenuity and perseverance enabled him to introduce; and we see the result in the magnificent volumes published by Messrs. Bradbury and Evans.

In all these processes, however, the plate from which the impressions had to be printed was an electrotype copy of the soft lead plate in which the object was engraved, and a considerable amount of labour and skill in burnishing and touching up had to be expended before the plate was fit to yield a satisfactory impression.

This is not the case with the direct process, or with Mr. R. F. Sturges' method of copying lace, &c., and more particularly as carried out in reference to natural objects by Mr. W. C. Aitken. The impressions of the most delicate skeleton of a leaf, or a feather with its down, are impressed direct in all their delicacy, and the plate is ready to print from at once.

It was this fact which led me to the experiments which have resulted in the process I am now to describe, for on seeing the first specimen of a feather engraved by Mr. W. C. Aitken, early in 1852, I asked myself mentally, "If the down of a feather can be made to impress itself in a metal plate, and print, why not a drawing?" The next question was, "How to do it?" Urgent duties prevented any experiments until the winter of 1858. The result of these experiments I shall now give in detail.

No want has been more strongly felt in the arts than some easy, rapid, and direct method by which the spirit and mental impress of the artist's own hand could be reproduced in a metal plate, or type, either in intaglio or relievo. I remember reading, when a youth, in some old edition of the Life of Albert Durer, that he had solved this problem, and had a secret method, which died with him, by which he could transfer a drawing to a metal type and print from it. Whether this was simply a mystical description, by some person ignorant of art-processes, of the ordinary method of etching, in which Durer was such an adept, I cannot say, but it made a deep impression on my mind, and the question how to bring about such a result was for years a subject of interest and speculation with myself, as it has no doubt been to hundreds of others. When, in 1842, Mr. Palmer commenced his experiments in glyphography, some friend, knowing my propensity to experiment in this direction, sent him to me, and I believe I executed for him the first drawing produced by his process, in which lines were drawn in imitation of etching, or the *fac-simile* style of wood engraving. After several experiments, however, not seeing my way to satisfactory artistic results, I declined to devote any more time to this process. I have ventured to name this as showing that my attention was by no means first drawn practically to this question, when the success of the direct nature engraving of my friend, Mr. W. C. Aitken, in 1852, directed it into a new channel. In fact, every process of the kind had been practically examined and tested—etching on copper and steel, lithography, zincography, the anastatic process, the paneiconography of Gillot, shown in the Exhibition of 1851, from which so much was expected in surface printing, had all had attention. The matter was, therefore, not taken up blindly, except in one point, and that a most important one, for every single step of the solution of the problem had to be taken practically in the dark, as there was no experience in the same direction to suggest, still less to guide, in a single experiment; and even now, after four or five years' experience, I rarely make an experiment without gaining some additional light, which either helps the certainty or extends the operation of the process. I beg, therefore, most distinctly to state, that I do not bring this before you as a perfected process, but simply as a method which, so far as experience has gone, has produced certain undeniable artistic results, and as containing, as I believe it does, the elements of far higher, much wider, and more practical issues in the future. I trust no one will tell me that because the effects shown on this occasion are only produced in *intaglio*, that it would be much better for economical purposes to produce them in *relievo*, and thus suit them to the immense demand for surface printed illustrations. Of all this I am quite aware; but having so far accomplished one phase of the invention and undertaken to explain it, I shall confine myself to that. Should I, having already made a beginning, solve the other part of the problem, and produce a block where I now only produce a plate, I shall ask for another opportunity to bring that before you in due course. In the meantime our subject is the production of a metal plate engraved direct from a drawing and suitable to be printed from at an ordinary copper-plate printing press, or for transfers in certain industrial arts.

There are several methods by which the drawings can be made, but I shall confine my attention to describing and illustrating those which have been most successful up to this time. The material may be paper of suitable texture, such as fine India post, or sheet gelatine, or the drawing may be made on the surface of the plate to be engraved, or on the plate-glass bed of the machine.

When a drawing is made on paper there is a choice of two methods. One is to make the drawing with a glutinous ink, which when apparently dry, will, by floating it upon the surface of water, or damping equally at the back, become so far wet again as to take up fine particles of emery or other hard granular substances reduced to a powder. The effects produced are bold and effective, but rather coarse, as the examples shown indicate. The other method is to make the drawing with the same material as that used in executing a drawing on sheet gelatine, on the plate, or the plate-glass bed of the machine.

These drawings on paper when engraved produce a tint all over the subject, the result of the texture of the paper itself. This tint may be very usefully employed in producing gradations of tone, when treated with a mezzotinto scraper and burnisher.

The material for executing the drawings on sheet gelatine, &c., presented the greatest difficulty, and cost some hundreds of experiments. It is composed of peroxide of tin, peroxide of manganese, Indian or Venetian red, Paris white, rice starch, gum arabic, and bichromate of ammonia, the latter being used for the purpose of converting the gum and starch into an insoluble resin, so as to permit of the repetition of the touches of the drawing, without disturbing the work previously executed. The relative proportions of the ingredients of this drawing material, which requires special care and experience in its preparation, are given in the specification of the patent,* by which the invention has been secured, and therefore need not be quoted here, as, of course, modifications are made for the purpose of producing special effects, of which the practice of the art can alone show the use.

This drawing material is classified for use as No. 1, with which the outline and basis of the drawing is executed; No. 2, which is darker in colour, is used to re-touch parts requiring greater force than that produced by No. 1; No. 3 is sometimes used for producing very strong granular effects in the shadows, but generally I think it best to avoid its use.

One great peculiarity of this process is the production in the metal plate of the effects produced by broad washes and touches executed with a brush, somewhat of the character of aquatint. These broad effects are produced in the drawing by the washes being thrown in after the simple outline of the subject is obtained with material No. 1, by means of a special material, which, for convenience, is called Tint A, to indicate its use. A more granular modification of this mixture, Tint B, is used to obtain greater force in such parts of the washes as the artist may deem desirable.

* Patent No. 1,299, 1860.

The drawing instruments used are pens, metallic or otherwise, of suitable quality as regards fineness or breadth of point, and the ordinary sable brushes used in water-colour drawing.

When a drawing has to be executed, say on sheet gelatine, the material is selected of as even thickness as possible, and with the surface upon which the drawing is to be made free from spots, bubbles, or other blemishes, as these will come in contact with the plate during the operation of engraving, and all defects will be re-produced as well as the artist's work. The piece of sheet gelatine is mounted in a card board mount, the "sight" being cut to the size of the plate in which the drawing is to be engraved. (A specimen properly mounted was shown.) Over the back is placed a piece of tissue paper, fastened only on one side, so that it can be turned back, while the subject is traced upon the gelatine with the drawing material No. 1, from a study prepared for the purpose, and as the gelatine is as transparent as glass, of course this tracing can be done with the greatest nicety. The outline being secured, the piece of tissue paper is then returned to its position, and the drawing has much the appearance, when looked through, of being executed on ground glass.

To facilitate easy execution I have invented a drawing desk with a glass top fixed in a frame. This can be placed at any convenient angle, and by this desk being placed so that the artist can sit opposite to the light, with a piece of white paper on the bottom of the desk under the glass, the light is thrown through the partly executed drawing, and every facility is thus given for finishing it with all the force and effect of which the process is susceptible. (A specimen of the desk was shown in use with a lamp.)

The drawing materials, being in the condition of powder, are mixed for use by taking a small quantity of the gradation required and adding to it sufficient water to make it flow easily and continuously from the pen. If used too thin, however, the lines produced in the engraving are not forcible, and the principle of the invention must then be carefully borne in mind, viz., that the lines will engrave in proportion to their substance, just as the natural object engraves according to the thickness and density of its substance. In this fact lies the whole condition of a successful drawing, and perhaps I could not give a better illustration than by reminding the artist that, as in oil painting, the impasto, or loaded portion of the drawing is in the lights, the reverse is the case in autotypography, for the deeper the shadow required the higher the relief of the drawing material should be off the surface of the drawing, as the greater will be the intaglio thus produced in the plate. Of course it would be hopeless to attempt to give precise rules for producing special effects. We are dealing with an art, and to know it it must be practised; and I believe that it has this merit, that the impress of the mind and manual dexterity of the artist will add to the great charm of the results produced, whilst the limit, under certain conditions, is simply that of the ingenuity and skill of the executant.

The drawing being ready for engraving, which it is as soon as dry—that is a few minutes after it is finished, although as a rule it is better to let it stand for a few hours—it is taken to the machine.

The machine now before you is a working model of improvements suggested by the experience gained in the construction of one four times the size, and by which the larger specimens have been produced. This consists essentially of a pair of rolls mounted on horizontal axes. The bearings of the lower roll are fixed, whilst the brasses of the upper roll in which it turns are capable of a verticle sliding motion in the side standards. By means of side screws and hand wheels the upper roll is raised or depressed. In this small machine the wheels are engraved with gradual degrees for the indices of pressure, which can be regulated to the 1520th of an inch by the usual relation between the rotation of the index wheels and the thread of the screws. The edges of these wheels are notched or toothed in correspondence with the graduated degrees, and a fixed index with a spring engages as the wheels are moved, thus indicating both the pressure and parallelism of the upper roll with the lower. Between the two rolls a horizontal table or bed, which is supported by steel spring bars, is made to slide. The table may be made entirely of metal, but in this instance it is made of steel, with a well, into which a piece of plate glass is fitted and securely embedded upon a sheet of gutta-percha. The plate-glass possesses great advantages over metal, both as regards surface and non-oxydization, whilst the facility with which it can be removed, when required, from the well or metal frame for convenience in drawing upon is of great importance.

The rolls are made to revolve by means of a worm-wheel attached to the axis of the lower roll, but working outside the framework. Motion is communicated by a worm which drives the wheel, the power being applied to a hand-wheel or winch attached to the lower end of the worm axis or shaft, which works within a bearing and hanging bracket attached to the frame of the machine. The rotation of this shaft and worm communicates a slow and steady motion to the lower roll, and as this is geared on the opposite side to the upper roll by means of toothed wheels, the rolls rotate simultaneously.

The method by which a plate is engraved has now to be described. The thickness of the plate being gauged by one of Whitworth's decimal gauges, the indices are turned to the particular degree indicated by that thickness, with an allowance of the 50th of an inch, and the thickness of the gelatine, which may be calculated at another 50th, as engraving pressure. It should be borne in mind, however, that the gelatine is elastic and yields probably full one-half its thickness, so that the *plus* pressure beyond the gauge of the plate may be taken at about the 30th of an inch.

The metal plates used are a good quality of Britannia metal, and, so far as experience goes, these print a fair number; but by taking advantage of Joubert's process for steeling the surface, or producing an analogous effect by means of nickel, the plates yield a considerable number of impressions; and as the drawing is comparatively uninjured by the process, several plates of the same subject can be produced from one drawing by a careful examination of it, and a little retouching in such parts as may appear worn or deteriorated by the pressure in the operation of engraving. In some instances as many as six plates have been produced from one drawing, and it is still available, and, unless injured by damp or some accidental cause, will be available for years to come.

It will be evident, from the nature of the process, that it possesses several advantages over any other in use for the re-production of the artist's work direct from his own hand. Thus:—

1. There is no reversal of the subject required, as it is drawn exactly as it is to appear when printed.

2. A plate can be engraved and proved to show the state of the drawing. The latter can be worked in again, and again proved, and this can be repeated until the desired effect within the limits of the process is produced.

3. The transparency of the sheet gelatine gives great facility for copying drawings by tracing all the leading features; and, of course, this applies to photographs, which may be largely used as guides, and art thus made to supplement science, since the artist has the power of selection in reproduction of the forms of the photograph by autotypography.

4. The rapidity with which designs, drawings, &c., may be reproduced, when they are once executed by the autotypographic process, which, as already stated, becomes with a slight degree of practice, as easy as ordinary sepia or Indian ink drawing.

5. The fact that the artist can retain the plate in his possession, and have such a quantity printed at a time as

may best suit his convenience, as in the case of an etched plate.

In all the illustrations given it must be distinctly understood that no after process, or any retouching whatever, has been used. All the examples are the result of the autotypographic process, pure and simple. It must be quite clear, however, that some of the effects could be rendered much more positive and telling by judicious touching up with the graver and etching needle. As, however, it would have been difficult to have defined where the process which is the subject of this paper ended, and that of touching up began, it was thought desirable that none should be shown which had been so treated. It must be clear, however, that for practical purposes those well known means of increasing the force of an engraved plate would be largely available when required.

There are only two points now to consider, and this paper may be brought to its conclusion.

The first is—Can the process be regarded as complete? To this I answer, as the inventor, that so far as the effects already attempted are conceived it may be, but I feel satisfied that in the hands of an ingenious artist, fertile in resources as regards the production of delicate and even powerful effects, it is susceptible of very great development. This however depends upon one point, to which I am particularly desirous to have attention paid on this occasion in any remarks which may follow this paper, and that is, whether in the present advanced condition of the art of illustrative printing in its varied forms, this process is worthy of special attention and further development.

The second point is the purposes to which, if this question is settled in the affirmative, the process can be artistically and economically applied. Under the latter head we may range the reproduction of artists' sketches at a comparatively cheap rate, the plate being held for use at any period subsequent to the reproduction; also plates for book illustrations and the production of portraits in a metal plate by the aid of a photograph, the autotypographic drawing being worked upon from life if necessary. The portraits so produced are, of course, as permanent as those printed from ordinary engraved plates. In the industrial arts, the production of transfer plates, especially for the "bat" process for the decoration of porcelain, appears to afford a considerable field of operation, as the drawing produced by the original artist is reproduced on the ware; and outlines drawn by a first-class artist may be transferred to the surface of an article in porcelain, to be filled in with colour by the artist workman, whose technical knowledge is thus used to the greatest advantage. It must be evident, too, that metallic surfaces being planes, may be decorated in a novel and effective manner by painting upon the metal plate the design intended to be engraved, and then submitting it to the action of the machine. Results may be thus obtained which no engraving with a point could possibly achieve, and these effects may be further enhanced by working upon with the graver.

Of course it is impossible to calculate what ingenious persons may make of any invention at the outset. Experience has shown that the most unpromising in the beginning have come out triumphantly in the end; and it is equally true that many processes of apparently great value and probable usefulness when first developed, have sunk into oblivion before the test of practical and every-day application. Whether the process I have brought before the Society of Arts in this paper belongs to the one category or the other it would be presumptuous to pronounce too distinctly in its present stage. I may be allowed however to state, in concluding this description of its purpose and leading features, that the main object I have had in view in following up a series of experiments extending over more than four years, at no little cost of time and money, has been the improvement of the arts of my country both pictorial and industrial, by bringing the artist himself nearer to the reproduction of his own work, and affording a means by which the impress of the original mind and hand shall be conveyed in a permanent form, for easy reproduction in considerable numbers, at a comparatively cheap rate.

As a matter of interest to the members of the Society of Arts, I think it a duty, as it certainly is a pleasure, however largely mixed with sorrow, for me to state, that the late lamented President of the Society, His Royal Highness the Prince Consort, expressed a very distinct and favourable opinion of the process in its application to various branches of art when specimens were submitted to him, and a desire to know more of the practical working than could be given by mere description; but his premature removal from his earthly sphere of usefulness prevented the fulfilment of arrangements proposed for meeting his wishes. We all know the intelligent interest with which he invariably investigated all matters which seemed worthy of attention, or likely to prove useful to the arts and sciences of his adopted country, and his readiness to encourage, by kindly words and judicious advice, efforts which he believed to be in the right direction. To myself, although greatly encouraged by the favourable opinion expressed, it would have been a source of infinite satisfaction to have submitted the whole process to the judgment of one so able to appreciate its value on the one hand, or detect its defects on the other.

DISCUSSION.

The Chairman said he would not anticipate the pleasurable duty which would be required of him presently, of proposing their thanks to Mr. Wallis for his interesting paper. One of the advantages attending these meetings was the opportunity which they afforded of hearing the opinions of gentlemen who had more or less devoted themselves to the study of the particular subject brought under notice; and he was quite sure there were many gentlemen present whose remarks upon the process which Mr. Wallis had so clearly and earnestly brought before them the meeting would be very glad to hear.

Mr. John Leighton said that nature-printing, like numerous other processes, seemed destined to go through many phases before arriving at maturity; not but that it had effected many things ably and well since the Labyrinthodon left his foot-prints on the page of nature, imprinting them upon antediluvian sands for the edification of the savants of the nineteenth century. Mr. Wallis had successfully adapted the process to engrave even a wash of Indian ink, a thing he (Mr. Leighton) fully expected to find had been done before in Japan, as he had found that the process of enlarging and reducing engravings, introduced in this room a year or so back as a novelty, was already in existence there, as noted in Sir Rutherford Alcock's work, "The Capital of the Tycoon." He (Mr. Leighton) hoped that Mr. Wallis's ingenious process—which certainly had many advantages—would be fairly tried, and that artists would aid the inventor in carrying it out. The process seemed particularly suited for producing a limited number of prints. What the future of the invention would be he could not say; though, with the means already devised of giving the plates hardness without injuring that delicacy so important to be maintained, it seemed capable of great extension. He might mention that lace was nature printed, at Nottingham, some years prior to the Great Exhibition of 1851, and exhibited by Mr. Taylor, of that town.

Mr. Dickes said they must all feel greatly indebted to Mr. Wallis for the very interesting paper he had read; at the same time he might be allowed to call attention to the fact that the alleged Danish inventor, Kyhl, was not able to continue his invention, because at that time the other invention of electrotyping was not known. Had Kyhl possessed the means of giving strength to the plates by electrotyping, he thought the chances were that he would have been able to have rendered his discovery commercially valuable. The same difficulty had been touched upon by Mr. Leighton, and it would be interesting to

know whether, without electrotyping, Mr. Wallis had any means of making his plates lasting, and so of commercial value. Mr. Leighton had mentioned that lace-printing had been carried on at Nottingham many years ago. That was the fact: but prior to that the glyphographic process of Mr. Palmer had been brought forward in London. Mr. Palmer carried on his process not merely with intaglio plates, but also with surface plates.

The Chairman enquired at what date that occurred.

Mr. Dickes replied that he saw it about twenty-five years ago. He had never given the Austrians credit for the invention of the nature-printing process, but he believed what they had done in the matter might be traced to the information they obtained from such sources as Mr. Palmer and others.

Mr. Durlacher remarked that, as far as he understood the subject at present, all the advantages pointed out could be obtained by the ordinary process of lithography and transfer paper. The artist made his drawing on transfer paper, which was transferred to stone, and then printed from to any extent required. He did not see any great advantage to be derived from Mr. Wallis's process.

Mr. Wallis, in reply to the remarks of Mr. Dickes, said his plates did not require to be electrotyped. They were produced, as they had seen, direct from the drawing, and then printed from. A considerable number of impressions had been circulated in the room, and a thousand more might be worked off from the same plate. That plate had a nickel surface, and he was more indebted to Mr. Joubert's process for hardening the surface of the soft metal plates than to anything else. He was quite aware that if Kyhl had had the advantages of electrotyping, no doubt his ingenious invention would have been carried out long before, and therefore he wished to do full justice to the ingenuity of that individual, who, however, carried the discovery no further than the producing of metal plates of a soft character, and printing a few impressions from them. He (Mr. Wallis) wished the meeting distinctly to understand that his process was perfectly independent of electrotyping; at the same time it was not independent of the deposition of metals, because he was indebted to the steeling and nickeling process of Mr. Joubert for giving hardness to the surface of the plates, which were composed of Britannia metal, with a hard surface of steel or nickel deposited afterwards.

Mr. Papworth said, in reply to Mr. Durlacher, that it had apparently been forgotten that the best transfer suffered from the inevitable expansion of the paper, whilst the present process promised the fidelity which the artist could only now secure by himself etching a copper plate; and if the gelatine would not expand, no more trouble seemed to be involved than the making a careful drawing upon it. Mr. Papworth, after saying how much he was astonished and charmed with the results of the process exhibited, observed that it gave, in fact, a sort of aquatint plate, but it required one point of attention more than a common drawing, namely, that every touch must have an actual relief from the surface of the gelatine on paper, and therefore, if an artist did not succeed at the first or second attempt, he need not think that the process would never answer his ends. As many replicas of Rowlandson's drawings were in existence, he might explain at once how they were produced, and how Mr. Wallis's project was foreshadowed, by saying that Rowlandson made one sketch with thick ink, and had it passed over half-a-dozen other sheets in the printer's press, so that he could colour and sell the seven as originals.

Mr. Joubert said they were much indebted to Mr. Wallis for having brought before them his method of reproducing drawings in a very simple and expeditious way. It was a move in the right direction, and he judged of the progress which Mr. Wallis was likely to make when he saw the present results and compared them with those obtained twelve or eighteen months ago. The difficulty hitherto had been, to find the means of reproducing drawings or designs with materials already in use by the public, because any process based upon the use of new materials offered more or less difficulty. They must first become acquainted with the medium and acquire a certain amount of experience in it before they could bring the new process to bear, and in that respect Mr. Wallis had not been exempt from this difficulty, though he believed it was less than in many other processes. No doubt if, instead of gelatine, ordinary drawing paper could be used, it would be a very great advantage. When they looked at the extraordinary results of photography, if a means could be found of producing a copper or other plate which would give the photographed image in all its beauty and purity, it would be an invaluable discovery. Several processes had been attempted for producing that result. He had one of his own, which he had not yet matured, although he had produced specimens by its means. He thought no doubt could be entertained as to the commercial value of this process in the rapid production of fac-similes. Some years ago there was a great demand for rapid engraving for railway maps and plans, and such a system as this would then have been of great value. He had no doubt Mr. Wallis would turn his attention in that direction. Reference had been made by Mr. Wallis to the assistance he had derived from the process which he (Mr. Joubert) had described, in a paper read before the Society,* of applying a steel surface to an engraved plate, which, no doubt, would be an advantage in this case, especially as he could show that from a plate a little harder than that of Mr. Wallis, as many as 17,000 impressions had been taken. The difference between this and the processes hitherto known seemed to be in favour of Mr. Wallis's process, on account of the inexpensiveness of the materials, and there was also great advantage in the plates not requiring to be electrotyped. They had witnessed the rapidity of the process in what they had seen this evening, and the impressions circulated in the room appeared to be highly satisfactory, although done in a very hurried manner. He believed it was a very valuable process, and in perfecting it he hoped Mr. Wallis would receive from this Society, and from the public at large, every possible encouragement.

Mr. B. Waterhouse Hawkins (responding to the invitation of the Chairman) said he would have preferred to delay any remarks he should have been glad ultimately to offer, because his intimate acquaintance with the process, and with all Mr. Wallis had been doing for a long period of time, had supplied him with an amount of knowledge which, if he had made use of it, would only have been a repetition of what Mr. Wallis himself had so well said. He would, therefore, only allude to two or three observations which had been made since the paper was concluded. He thought the most striking remark that had been made—and he knew Mr. Wallis was most anxious to hear all that could be said on the subject—was that in which a comparison was drawn between this process and the ordinary process of transferring by lithography. He need scarcely allude to the grand difference between the two. Here was a process by which all the delicate gradations that could be given by an artist's hand, as the result of feeling, were reproduced with the utmost facility and certainty. They had the grain of the line and every gradation of tint. He was almost inclined to characterise the process of the ordinary method of transferring from paper to stone or zinc as an artistic abomination—the most unartistic thing that could be done—considering it was not possible by such means to make gradations in tint, and it was difficult even to make gradations in the thickness of lines so as to give variations in tint. He thought it was only necessary to make this passing allusion to the great difference in the results of this process as compared with lithography. The Chairman had alluded to the thanks that were due to Mr. Wallis for his labours in this direction. He (Mr. Hawkins)

* See *Journal*, Vol. vii., p. 15.

would say if the fine arts were the only object of this Society, it should bestow upon Mr. Wallis its highest commendation, from the fact that he had thus enabled the artist's thoughts to be reproduced with fidelity, and thoughts were not now too plentiful, nor the means of expressing them too abundant. The development of the photographic art had stimulated a taste for fac-similes of real objects. The old system of sketching, which was an indication of the mental operation of the artist, had been almost discouraged; indeed, it was out of date, because of the new relish that had sprung up for the re-production of actualities and realities in art, so that it was necessary to reproduce every fold in the drapery, which only encumbered the artist in the expression of his thoughts. If this process was a means of helping the true artist to express his thoughts rapidly, and to circulate them largely, they were much indebted to Mr. Wallis. But as the second object of the Society of Arts was to encourage all that increased commerce and aided manufactures, they must look a little further, and see whether they could not trace out a commercial application of Mr. Wallis's process. He (Mr. Hawkins) was aware, from his own experience in the matter, that it was applicable to the higher class of decoration of porcelain. They must all remember with great delight the charming character of the Raffaellesque ware, in which they remarked the hand of the great artist who condescended—if it could be termed a condescension—to bestow some attention to that class of work, but, thanks to Minton and others, who had of late turned their attention to this subject, they found again a desire and good-will on the part of the artist to combine the work of the hand and of the mind upon objects of every-day use. Here, again, arose the difficulty of producing such articles combining high artistic excellence with economy of production. To this end there must be a certain power of reproduction, or such works were not brought within the means of the public at large. This process afforded every facility for transferring to objects of utility the actual impress of the artist's mind, his living thoughts; and if such manufacturers as Copeland, Battam, and others would undertake the application—and he knew how much good-will there was for all such experiments—he was sure they would find this process applicable for the adaptation of high class designs to objects of every-day utility.

The Chairman said he now came to the very agreeable duty of proposing a vote of thanks to Mr. Wallis for his paper. He was quite sure, from the interest with which it had been listened to, all present felt their obligation to that gentleman, not only for the value of the information he had given, but also for the clear manner in which he had illustrated his process in their presence. Mr. Hawkins had spoken so ably, and had covered the ground so fully, that he believed the meeting would respond to all that had fallen from that gentleman. The mere question of the relative value of this process, compared with others, was an interesting one; but neither could this invention, on the one hand, take away from the merit of former ones, nor, on the other hand, could any comparison diminish their gratitude to Mr. Wallis for having worked out his process in the careful, and, as he apprehended, expensive manner he had done. All these processes, which had been so ably traced in the paper, were valuable as having led from one thing to something beyond. The progress of all science had been made by steps, and they knew how much one step in advance depended upon that which preceded it. Mr. Wallis, in the introductory portion of his paper, had given them an interesting account of the different inventions or processes carried out by Sturges, Branson, Worring, and others, and was disposed to think that none of them had heard of the process of Kyhl, inasmuch as he had not been able to carry out his invention, and it was supposed it had been forgotten. He (the Chairman) did not know whether Mr. Wallis had a right to assume anything of the kind. If the invention of Kyhl was deemed of sufficient importance to be placed upon the archives of Copenhagen, the subsequent experimenters would no doubt have heard of it; but that did not detract from the merit of other inventors. It had been remarked that "invention is but memory half forgot," and it was astonishing how slight a hint would sometimes have a powerful influence upon an impressible mind. Some minds might work through a lifetime without receiving a single impression, whilst other minds were so constituted that they received and retained impressions from everything that passed around them, and long after, when these impressions might seem to have been forgotten, the divine quality of the mind would reproduce and apply them. Still, however, it was often the case that two minds might have conceived the same thing. They would recollect the passage in the "Critic," in which an author, on being charged with some little plagiarism, replied—"Two great men may have the same great idea; but Shakspeare had it first." Two minds, whose studies and tendencies worked in the same direction, might easily arrive at the same results, without being indebted to each other; but still it was often the case that a process of which the first inventor had only given the slightest hint, was seized upon by a congenial mind at a future time and carried into practical effect. Therefore, although he believed these Birmingham gentlemen were not indebted to Kyhl, he thought it probable the experimenters at Vienna had some knowledge of what had previously been done at Copenhagen and elsewhere. As Mr. Wallis had said, no doubt the Birmingham inventors were too much occupied with their own pursuits to be able to inquire into the experiments made in other countries, but he thought it probable that what was done elsewhere was known at Vienna by men who devoted themselves to scientific studies. In the "Century of Inventions" there were many things vaguely shadowed forth which had since been practically realised. It was most curious to remark the manner in which, in the writings of early days, things were hinted at, almost in a prophetic spirit, which had since been realised. Thus Shakspeare spoke of putting a girdle round the earth in forty seconds. That had been accomplished by the electric telegraph. It was impossible to go through all the instances of this; but a very interesting French work on this subject had been published, in which they would find the germ of almost every invention of the present time hinted at, as if there were certain minds so constituted at certain periods, so divinely formed, as to prepare the world for the great discoveries of after times. Therefore, he said, they must not underrate Kyhl's invention, because he might have been, without their knowing it, the real originator of the process for which Mr. Wallis deserved the credit. Albert Durer was supposed to have discovered something of the same kind. Mr. Wallis thought it a mere fancy, but he (the Chairman) did not believe in fancies in matters of this kind. In the life of Della Robbia, it was stated that he was in possession of a secret process for the preparation of the material for his models, which were remarkable for their great beauty, and that he would not divulge that secret during his lifetime; but in order that it might not be lost after his death, it was buried within one of his works. All his works were in terra cotta, so that if it was found at all, it could only be done by breaking up all his models. They might break the last one before they got it; and it might then be found that Minton had been doing the same thing, for a number of years, much better than it was done by Della Robbia. To come back to the process more immediately under consideration, he would remark that he did not like the term "engraving" as applied to it. The engraver would say, "I know nothing about this process." It was not engraving, but the most beautiful process of transfer he had ever seen. It resembled the transfer for lithographic purposes in its principle, but, as Mr. Hawkins had explained, there were great differences in the results obtained. It was literally a transfer throughout, first, of the artist's mind and feeling

to his drawing, and then that drawing was transferred to the plate and could be multiplied to any extent. It was a transfer from the artist himself to the public, and there was no intermediate process by which the work might be spoilt. Mr. Wallis had very modestly said he did not consider he had yet brought his process to perfection. He (the Chairman) would be sorry if he had. He did not believe so beautiful a process could be brought to perfection in a short time; but they were indebted to Mr. Wallis for having opened the door so wide and so well that it could not be said the process was only in its infancy, for he had arrived at a means by which an artist's work could be reproduced precisely as he gave it forth. The question that had occurred to him (the Chairman) in hearing the description of the process was whether the extreme smoothness of the surface of the gelatine paper would not affect the value of the drawing. He also apprehended the size of the pictures would be limited to the size to which the gelatine could be prepared. Mr. Leighton had asked the question, whether Mr. Wallis would be prepared to execute these works for artists and amateurs. There came another question, on which he should like to hear the opinion of Mr. Wallis—viz., whether it was possible—and he believed it to be so—to make the drawing upon a more agreeable medium than gelatine, something with a little more grain in it, and if Mr. Wallis did not succeed it that respect, he had no doubt, when the process was better known, somebody else would. All these considerations were so many steps towards the perfection of the process, and he had no doubt would ultimately lead to most important results. He now begged to propose that the cordial thanks of the meeting be given to Mr. Wallis for his valuable and interesting paper.

The vote of thanks having been passed,

Mr. Wallis, in acknowledging the compliment paid to him, said the subject had been discussed in so kind a spirit that he felt bound to thank those who had criticised him, for he believed out of this much good would come. He quite agreed with the Chairman that it was highly probable that others would succeed in making this process more valuable than it now was. There were many points which he saw were desirable, and which time might enable him or some one else to effect. With regard to the question of the size of the pictures being limited to the size of the gelatine paper, of course that would be so, but he had been assured by an eminent maker of that article, in Paris, that he could prepare it to any reasonable size at a small extra cost, and perfect as regarded the surface, so that there would be no practical difficulty on that score. With regard to the commercial part of the question, to which Mr. Leighton had referred, he might say he hoped to make such arrangements as would enable him, or some trading firms who took the matter up, to receive drawings from artists and amateurs, to be transferred to the plates, by whom also the materials for the drawings would be supplied. When the plate was produced from the drawing a proof impression could be sent to the artist for alteration or improvement, and again sent back and reproduced, after which any number of impressions required could be worked off, either for the purposes of the artist or for the illustration of books which would not bear the expense of engraved blocks. He felt much indebted to his friend Mr. Waterhouse Hawkins for his remarks in comparing this process with that of lithography. He was prepared to admit that the advances in that art had been most wonderful; but it still required the aid of a specially educated artist to carry it out in the best manner. His own purpose was to meet the artist upon his own ground, and to produce a process by which he would be enabled without further trouble to himself to reproduce drawings without the intervention of others. It was not intended to enter into competition with any of the existing processes. Each process had its value, and each would no doubt keep its position, but when they considered the amount of skill required to make a good lithographic draughtsman, the superiority of the present process would be apparent to everyone present. Supposing Barry had had the advantage of this process in his etchings of the famous pictures round that room, he could have executed his work without the necessity of such a large amount of labour, and the effect would have been more satisfactory. He had said only thus much, because he felt that his friends had defended all the other points to which exception might be taken. He was conscious there were still many defects in the process, and that a great deal more remained to be done. So far from being satisfied, he was at times very much the contrary. He felt the process was capable of better things. Whether he, himself, would bring it to perfection, or whether this would be done by others, he could not say; but if his health were spared, and he had the means, he would try. The deep interest in the subject which had been evinced this evening was an ample reward to him for the trouble he had taken in bringing the matter before them.

Illustrative experiments were carried on during the reading of the paper, and the delivery of suitable incidental explanations. These experiments consisted of engraving a plate from a drawing of a figure of "Autumn," specially designed and executed by Miss Leila L. Hawkins, who has very successfully practised the process. This operation occupied a few minutes, the actual engraving or impressing of the plate not taking more than four or five seconds. Impressions from the plate, after it had been washed with water, to remove any portion of the drawing material which might have adhered, were taken at a copper plate printing press, and distributed among the audience, as also impressions from a drawing of a device, designed by Miss L. L. Hawkins, in commemoration of the marriage of the Prince and Princess of Wales, in which the auto-typographic process was used for the figures of Cupid and Hymen supporting the Prince of Wales's plume, which was engraved from three feathers, as an illustration of the direct process of nature printing. A design for the back of a playing card, executed by Mr. Andrew, but only partly finished, was also engraved and printed. This also showed the application of the process to the ornamentation of metals. Mr. G. M. Atkinson and Mr. J. Le Resche having kindly undertaken to execute drawings on the spot, a plate was engraved from a sketch executed with the brush by the former gentleman, from the figure of King Alfred in the "Elysium" of Barry, which adorns the great room of the Society of Arts, in which the meeting was held. A sketch, with a pen, of a cairn in the Isle of Man, by Mr. Le Resche, was not engraved for want of time. Illustrations of the practical application of the process to ceramic decorations, in the style of the ancient Raffaelle ware, were shown, the transfer plates having been engraved from designs and drawings by Miss Leila L. Hawkins, who had filled in one of them, as the decoration of a tazza, with colour. Mr. Battam, of Gough-square, Fleet-street, has kindly undertaken a series of trials for this purpose.

The Secretary announced that on Wednesday

evening next, the 22nd inst., a paper by Capt. T. E. Symonds, R.N., "On the Construction of Twin Screw Steamships," would be read.

ARTIFICIAL ILLUMINATION.

Dr. Frankland, in a lecture lately delivered at the Royal Institution, in speaking of the discoveries and improvements connected with gas as an illuminating agent, said, "It is of great importance that gas, as a light-giving material, should be improved to the greatest possible extent, so as to make it a perfect source of light. Its conveniences are so patent to every one, its use is attended with so few discomforts, and the light is obtained with such facility, and of any desired intensity within certain limits, that there is, perhaps, no source of artificial light capable of such general application. Nevertheless, this is one of the modes of illumination which, having been long previously in use, have not made great progress during the past ten years. The sulphur compounds, which at the commencement of that time were complained of as being present in purified gas, are still there in considerable, if not in undiminished, quantity, although there has recently been a process devised by means of which these impurities can be, to a great extent, got rid of. It remains to be seen whether this process be applicable, on a large scale, in the gas manufactory; but, so far as can be judged from experiments made upon a small scale, it is a process which is likely to be very effective. It is the invention of the Rev. Mr. Bowditch, of Wakefield. These sulphur compounds are irremovable in the ordinary process of purification. The gas may be passed in the usual manner over hydrate of lime, or the peroxide of iron; but this operation does not, in the slightest degree, affect the sulphur compound in question. During the combustion of the gas, however, their sulphur is converted into sulphurous acid, which diffuses itself in the apartment in which the gas is burned, and a great deal of the discomfort of which many complain in the use of gas is due to this cause. Mr. Bowditch discovered that though cold hydrate of lime will not remove these impurities, they are to a great extent got rid of by heating the hydrate of lime to a temperature varying from the boiling point of water up to 400° or 500° Fahr., a temperature of 400° being the most effective for the development of the effects of his process. The heated hydrate of lime converts the sulphur compound into sulphuretted hydrogen and carbonic acid, which can then be removed by the ordinary purifying material—cold hydrate of lime. This process has been found by repeated experiments to remove all but about two or three grains of sulphur per 100 cubic feet of gas, the quantity of sulphur originally contained in the gas varying from five to six grains up to 20 grains in 100 cubic feet. Heated hydrate of lime was shown to develop sulphuretted hydrogen from the gas supplied to the Institution.

"Another recently ascertained fact in connection with gas is the discovery of a new illuminating constituent recently made by M. Berthelot. This is a gaseous body, called Acetylene, which is produced under very peculiar circumstances. Unlike all other hydrocarbons with which we were formerly acquainted, an intense heat is favourable to the production of this body. For instance, it is produced when coke is very intensely ignited in hydrogen gas; and Dr. Odling has recently demonstrated that two of the constituents of coal gas, light carburetted hydrogen and carbonic oxide, which are useless for lighting purposes, may, by means of strong ignition, be made to form acetylene, and thus become luminiferous agents. It has generally been considered important to preserve a moderate degree of heat in gas-making, in order to prevent the destruction of the luminiferous hydrocarbons; but the discovery of the formation of acetylene, under the circumstances named, will render it necessary to investigate how far the production of this substance can be carried on upon a large scale, and rendered valuable for increasing the illuminating power of gas. The subject is yet in embryo; but it has an important bearing upon the future progress of gas-lighting. Acetylene and olefiant gas contain, in equal volumes, the same amount of carbon, but the former contains only half as much hydrogen as the latter; consequently, the illuminating power of acetylene is probably at least double that of olefiant gas.

"The compound of acetylene with copper, is a substance not altogether devoid of interest to the gas-manufacturer. When it attains a certain heat, it explodes with considerable violence, and the same effect may be produced by friction. It has been demonstrated recently, that acetylide of copper can be produced by the passage of ordinary coal-gas, containing, as it does, a trace of ammonia, through copper or brass tubes; and explosions which have taken place through cleaning out such tubes, resulting in serious injury to workmen, have been doubtless due to the presence of this substance. It is, of course, obvious that an explosion of this kind, even if slight in itself, may be communicated to explosive mixtures of gas and air (in a gas-holder or gas-meter, for instance), and may thus lead to very disastrous results. An explosion of this kind occurred a few years ago in Lancashire. A large meter had been detached, and brought into the open air; a workman was unscrewing one of the brass connections, when the meter exploded with a loud report. The explosion could not be accounted for, as all the eye-witnesses were positive that no ignited body of any kind was near the meter."

The improvement effected in the production and application of oils for illuminating purposes were next referred to.

The animal and vegetable oils, which for ages have been employed for this purpose, have received no development of importance during the last ten years. On the other hand, new sources of this class of illuminants have been discovered, which threaten to produce a great revolution in the modes of obtaining artificial light.

SUGAR CULTIVATION IN NATAL.

The following is extracted from the *Natal Mercury*, of January, 1863:—

One of the most interesting incidents connected with the progress of this product is the erection of the first vacuum pan introduced into the colony. This is the highest development that the art of sugar manufacture has attained, and even in Mauritius the number of estates possessing this appliance is only a small percentage of the aggregate. It unfortunately happens that the utility of vacuum pans to the planter is very much diminished by the differential duties, levied on a high class article in England, compelling the producer, in self-defence, to turn out a low quality of sugar. During this year another still later improvement in sugar making will be tested, and the gentleman who has had the enterprise to essay the experiment will, we hope, find the new plan answer his expectations. There have not been many new mills erected since our last review, and a few changes of proprietorship have occurred. It is a sound indication that those who are most hopeful about sugar planting are those who have been the longest time engaged in the enterprise. When we see old colonists beginning to plant sugar we may assume that the occupation is a paying one; and when we see men who have been planting sugar for six or eight years extending their operations, and renewing their efforts, we naturally conclude that they are more than satisfied with the calling they have espoused. Natal has some difficulties to contend with, but we feel convinced she will become a large sugar-yielding country. We say this after personal observation in the Mauritius, and after

personal communication with sugar growers in different parts of the world. The increasing demand for home consumption reduces the export of the article, and the Customs Returns are not therefore a fair reflex of production. Two cargoes, however, besides many large shipments, have been made, although we do not anticipate that the annual export will be larger, if so much, as the previous year. This year, on the other hand, we may look forward to a considerable increase.

PREPARATION OF ALCOHOL FROM COAL GAS.

The following is extracted from the *Chemical News* :—

When we first saw in the newspapers the announcement that "a young French chemist had discovered a process by which alcohol could be made from coal gas with an economy of 60 per cent. over the methods now in use," we confess we felt proud of being connected, however humbly, with a science capable of such marvels.

Knowing what had been done for the chemistry of the alcohols by men bearing such names as Hennell, Liebig, Dumas, Gerhardt, Wurtz, and Berthelot, not to mention a host of others, our feelings gradually merged into surprise, that it should be reserved for an unknown name to acquire such lustre at one leap. Nevertheless, so authoritative was the announcement that we did not question the fact, but patiently awaited the unveiling of the mystery. Our readers will guess our chagrin when we found that the process was not only not new, but that it was only an attempt to apply in practice the method foreshadowed by Hennell and realised by Berthelot. That it was, in fact, to hydrate olefiant gas by the agency of sulphuric acid.

That sulphuric acid is capable of fulfilling the paradoxical functions of hydrating olefiants, and yet of dehydrating alcohols, according to the conditions of the experiment, we at once admit; and we doubt not that by operating on a sufficiently large scale, alcohol might be prepared by a modification of Berthelot's process in quantity; but that it could be done with an economy of 60 per cent. over the methods at present in use we do not for an instant believe.

Unfortunately the process is not one the economy of which can be tested with the ordinary resources of a laboratory, and we can only therefore found our judgment upon the evidence afforded by the published specification.

M. Cotelle, the patentee, employs several modes of producing intimate contact of coal gas with the sulphuric acid. The first is by means of a pump to discharge the acid in the form of rain into a leaden receiver containing the gas, the second is a more complex method of operating, but on the same principle. The third is to procure absorption by pressure, as in preparing soda-water, and the fourth consists in placing the sulphuric acid in the form of vapour in contact with the gas. The details cannot be given without engravings, and we must therefore refer those of our readers who desire to study the process to the patent.*

The patentee assures us that "except losses which can never be prevented in great concerns, the sulphuric acid that is employed may serve almost indefinitely." To carry out this, it is proposed, after diluting the acid which has combined with the olefiant gas, to distil it to obtain the alcohol, and then to concentrate the diluted acid to the strength required to enable it to act on fresh quantities of gas.

We do not for a moment deny that by proper management of the absorptive apparatus the olefiant may be dissolved in the acid, but we greatly doubt whether more than a very small portion of the dissolved gas becomes converted into alcohol on subsequent dilution. Moreover, we conceive that on concentrating the acid much loss will be incurred, owing to formation of sulphurous acid from the carbonaceous matters, which are, we think, sure to remain with the acid.

* 1862, July 19, No. 2,062.

The cost of the fuel required to concentrate the highly diluted acid to a state fit for operating on fresh gas will also be considerable.

When we consider also that it will be necessary to have pumps unceasingly at work with sulphuric acid of the strength known as pan acid, and of a density therefore of about, 1·767, it must be admitted that "wear and tear" of machinery will be a not unimportant item in the expenditure of the "Company Cotelle."

Taking the above objections only, and disregarding the prejudice which will certainly be felt against the employment of coal gas spirit for any thing but manufacturing processes, we must admit that we have no faith in the practical utility of M. Cotelle's patent. The specification, moreover, shows no ingenuity; the modes of procuring contact between the acid and the gas are merely those which would suggest themselves to any one giving even a very small amount of attention to the subject, and they constitute the only part of the patent upon which M. Cotelle had the opportunity to exercise his talents, inasmuch as the chemical part of the process had been done previously by others.

Some of our friends have felt alarmed lest to their numerous delinquencies wine merchants should add yet another—the sophistication of wines and spirits with M. Berthelot's hydrated olefiant gas. Let them be tranquil, the chances of such an adulteration being profitable, at least for some years, are very remote.

ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS.

At the last ordinary monthly meeting of the Executive Committee of this Association, held at the offices, 41, Corporation street, Manchester, on Tuesday, February 24th, Hugh Mason, Esq., Vice-President, in the chair, Mr. L. E. Fletcher, chief engineer, presented his report, embracing the month of January as well as that of February. The following is an abstract :—

During the last two months, *i.e.*, from January 1st to February 20th, the ordinary visits of inspection have been made, two boilers tested by hydraulic pressure, and the following defects discovered in the boilers examined, viz.:—Fracture, 4; corrosion, 45 (5 dangerous); safety-valves out of order, 8 (1 dangerous); water-gauges ditto, 28 (2 dangerous); pressure-guages ditto, 19; feed apparatus ditto, 9; blow-out cocks ditto (mainly from neglect), 37 (1 dangerous); fusible plug ditto, 1; furnaces out of shape, 3 (1 dangerous); blistered plates, 3. Total, 157 (10 dangerous). Boilers without glass water-guages, 10; without blow-out cocks, 17; without back-pressure valves, 64.

Explosions.

Another death has resulted from the explosion which occurred to the iron-works' boiler referred to in the monthly report for December last, thus making in all 11 deaths from that single explosion, while, in addition, 25 persons were injured.

Three explosions* have been reported since the commencement of this year, from which, however, no lives have been lost, nor any personal injury done worth mentioning. Not one of the boilers in question was under the inspection of this Association. The following is a tabular statement:—

* Since this was in type, another explosion of a very fatal character has occurred. Engineering particulars as to the construction of the boiler and cause of the explosion will be given in the next monthly abstract, the explosion having happened on February 23rd, while the present report closed on February 20th.

From January 1st, 1863, to February 20th, 1863, Inclusive.

Index No.	Date.	General Description of Boiler.	Persons killed.	Persons injured.	Total.
No. 1.	Jan. 12th	Ordinary double flue, or "Lancashire." Internally fired.	none.	none.	none.
No. 2.	Feb. 6th	Plain Cylindrical. Externally fired.	—	—	—
No. 3.	Feb. 7th	Plain Cylindrical. Externally fired.	—	—	—

No. 1 Explosion.—There has been no opportunity of investigating the cause of this explosion, neither have any reliable reports been obtained, but with regard to No. 2 and 3 a personal examination has subsequently been made of the boiler in each instance.

No. 2 Explosion.—The boiler in this case was externally fired, and of plain cylindrical construction, the ends being slightly domed. The length was 5 feet; the diameter, 2 feet; and the thickness of the plates, $\frac{3}{8}$ths in the ends, and $\frac{1}{4}$ in the remainder. The cylindrical portion of the shell was composed of two plates, about three feet wide, laid lengthwise. and flanged at their attachment to the end plates, which were in one piece. The complement of fittings was most incomplete, the number of those omitted being greater than those supplied. There was no feed stop-valve, no feed back-pressure valve, no steam pressure-gauge, nor any tap for applying the indicator as a test of the actual pressure. The only fittings were, one glass water-gauge, and one safety-valve, the latter stated to have blown off at a pressure of 25 lbs. to the square inch.

The boiler had lately been purchased second-hand, and not put into regular work since its re-setting. In consequence of this, the feed-pipe was not yet connected, and the boiler had been supplied with water poured in by hand at the safety-valve when the steam was down. The engine was standing at the time of the explosion, but had been working about an hour previously.

The results of the explosion to the surrounding property were, that the workshop in which the boiler was set was laid completely in ruins, the chimney levelled to the ground, and the windows of a house on the opposite side of the street broken by the concussion. The boiler was rent into five pieces, one of which was blown across the street, and lodged upon the top of the opposite house, while the manhole cover was thrown upon the roof of a shed in another direction.

With regard to the cause of the explosion, the primitive mode of feeding the boiler naturally excited suspicion as to the sufficiency of the supply of water; and with this view, therefore, a particular examination was made of the remaining fragments of the glass water-guage, the colour of the plates, and the position of the fractures; in addition to which, the circumstances attendant on the working of the boiler were inquired into. The result of this investigation was, that shortness of water did not appear to have been the cause of the explosion, and this conclusion was corroborated by further examination, as will be seen from the following particulars.

The safety-valve, which was supposed to have blown off at 25 lb. pressure, was found, on investigation, to have been loaded to upwards of 100 lbs.; the diameter being one inch, the proportions of the lever thirteen to one, the weight at the end 5 lbs., in addition to that of the lever itself. It is impossible to say, however, whether the valve had been free or not, since it, as well as the lever, had been blown away; and as there had been no steam-gauge, the pressure must always have been a matter of uncertainty, and thus it can only now be concluded that 100 lbs. on the square inch was the minimum.

A boiler, however, of such dimensions as the one in question would, if well constructed, withstand a much higher pressure than that of 100 lbs. per square inch; but, in this case, the manhole had not been strengthened with any mouth-piece, and consequently made a very weak point in the shell, from which the explosion appeared to have arisen. Five rents had started from it, while the remaining fractures were all subsidiary to these, and nothing more than the simple development of them.

The effect of the manhole would be to throw upon the plates of the shell, in the immediate vicinity of the opening, an extra disruptive strain of about 10 tons, added to which, the cover being an internal one, there would be acting upon it an upward pressure of steam amounting to about five tons, and tending to drive it through the manhole. The cover was a bad fit, being much too rounding, in consequence of which difficulty had always been experienced in making the joint, and it had been severely tightened by a stout bolt, which left the impression of the heels of the bridge in the plates. When it is remembered that the thickness of the plates was only $\frac{1}{4}$ of an inch, it will not be thought surprising that fracture should have occurred at the manhole, under the above circumstances; and the fact of five of the rents emanating from this point, and all the others being explicable upon the view that fracture commenced there in the first instance, it is thought to be conclusive that the mal-construction of the boiler, in not being suitably strengthened at the manhole, was the cause of the explosion.

The proprietor of this boiler had just purchased it, in addition to a small engine, with a view of increasing his business, but has not only lost the savings he had thus invested, but involved himself with regard to the surrounding property; an illustration of the false economy too frequently practised with regard to boilers, as well as of the risk to which lives may be exposed, though unintentionally so, when, as in the present instance, such ill-appointed boilers are worked in the heart of a populous city.

No. 3 Explosion.—The circumstances in this case were very similar to those in No. 2. The boiler was externally fired, and of plain cylindrical construction. The length was 7 feet 6 inches; the diameter, 3 feet; while the plates varied in thickness from $\frac{5}{16}$ths to $\frac{1}{4}$. The boiler was made out of an old flue-tube, taken from an internally fired boiler, and the longitudinal seams were in line. The fittings consisted of only one float, and one safety-valve, there being, as in the previous case, no steam-gauge, nor any means of ascertaining the actual pressure. At the time of the explosion the engine was not at work, but the steam was being got up in preparation for starting, and the boiler was stated to have been amply supplied with water, which an examination of the plates and fractures, afforded no reason to doubt.

As to the cause of the explosion, there could be no room for hesitation. The safety-valve, which was stated to have blown off at 50 lbs. pressure, proved to have been actually loaded to upwards of 200 lbs., the diameter being only three-quarters of an inch, the proportions of the lever, seven to one, and the weight with which the lever was loaded, 21 lbs. The manhole in this boiler, as in the previous one, was not strengthened by any mouth-piece, and the rents, as before, had started from this opening.

Attention has already been called in these reports* to the weakening effect produced upon the shells of boilers by unguarded manholes, as well as by openings cut in the plates at the base of steam domes, and a case of explosion from these causes previously recorded.

All modern well-appointed boilers have, as a rule, their manholes strengthened by strong mouth-pieces rivetted to the plate, the surface for the cover-joint being

* *Vide* Annual Report, 1861, p. 81.

faced; still, it is thought that the weakening effect produced upon the shells of boilers by steam domes has not, as yet, received sufficient attention, and although it may have proved hitherto comparatively harmless, that the gradual increase of pressure, now generally taking place, must shortly force the subject into notice, and thus prominence is given to the details of these two explosions with a view of showing the importance of the subject. The danger of working without steam pressure-gauges will also be apparent from both of the above explosions.

The results of this explosion were curious rather than serious, and attested the force of atmospheric concussion produced by steam. A dwelling-house directly facing the boiler, and situated about 50 feet from it, had its four windows, two on the ground floor and two immediately over them, all dismantled. A shower of bricks had been projected through the lower window immediately opposite the boiler, and had left their scars upon the walls of the room inside, while the two upper windows were also blown in. This will not excite much surprise; but the other lower window was stated not to have been blown in but drawn out, and this was attested by the debris of the sash lying upon the ground in the yard, while it was added that a looking-glass standing in the room had been sucked out along with the window-sash, and thrown upon the ground outside.

The same apparent anomaly has been noticed with regard to explosions caused by gunpowder, some objects being thrown away from the seat of the explosion, and others drawn towards it. This is accounted for by the double action that takes place, namely, first an expansion, which causes pressure, and then a recoil, which produces exhaustion. Some objects are more susceptible to the effect of pressure than exhaustion, while others are the reverse, and each succumbs to that action to which it is able to offer the least resistance. Thus, unguarded windows fall under the first action—viz., that of pressure consequent upon the expansion, while outside shutters, adapted to resist external aggression, withstand the former, but yield to the exhaustion consequent upon the recoil.

There were further signs on the roof of an adjoining shed of the force of atmospheric impact, consequent on the explosion. This shed stood at right angles with the dwelling-house, and extending toward the seat of the boiler, formed, with the buildings immediately adjoining the latter, nearly three sides of a square. A considerable portion of the side of this shed nearest the boiler was open, while the other sides were closed. The effect upon the shed was, that many of the stone flags, with which the roof was covered, were blown up, and, clearing the pegs which hung them to the rafters, slid down upon the lower ones, while others mounted the rafters only and there remained. The portion of the roof affected was the side of the gable opposite to the open doorway, and most distant from the boiler, since that side presented a surface more nearly at right angles with the direction of the impulse than the other. These particulars, though not important in themselves, afford, it is thought, additional evidence of the high pressure at which the boiler must have been worked.

In conclusion, no cases of such excessive pressure, as those given in the report above, have ever before come under my observation; and I trust that it will be seen, from the results which followed, what an engine of danger an ill-appointed steam boiler may become; and also, how seriously the shells of boilers are weakened by gashes cut in their plates, either at manholes when unguarded by substantial mouth-pieces, or at the base of steam domes; and I would recommend that all boilers should be fitted with a steam pressure-guage, and those working separately, with a duplicate safety-valve.

Home Correspondence.

FIRE ENGINES.

Sir,—A letter having appeared in your last impression impeaching the statements made by me in a paper read before the Society of Arts on the "Suppression and Extinction of Fires," I beg to inform your readers that the table of results of actual public trials of steam fire-engines is not "a digest" of any individual's "official report," but are from notes taken by myself at Hodges' Distillery, Lambeth, on the occasion of every public trial that has taken place there, including others elsewhere which I have attended.

I have carefully compared these results, and have noted in the table the best performance of every engine, in compiling which it was my endeavour to act fairly and impartially. My success was, I think, proved by the courteous and attentive manner in which my paper was received by all the engine makers who were present at the meeting on March 18th.

I beg, therefore, to maintain the correctness of my table.

I am, &c.,

CHARLES B. KING, M.E.

30, Abingdon-street, Westminster, April 14th, 1863.

STREET ILLUMINATIONS AND DECORATIONS FOR FETES.

Sir,—I have read with much satisfaction Mr. H. C. White's letter in the last number of the *Journal*. I am at a loss to conceive what good purpose can be served by the appointment of the proposed committee; on the contrary, I am of the opinion that such a course of action is at variance with, and derogatory to, the functions of a body such as the Society of Arts.

I trust the Council will pause before they finally enter upon this question, and that a strong feeling of disunity with such a proceeding will be manifested by the members generally. I am, &c.,

GEO. L. NEIGHBOUR.

127, Holborn, April 8, 1863.

Sir,—With reference to street illuminations, two things are necessary—it is the only way (in large cities especially) of finishing with *eclat* a public day of rejoicing, and it is the only means of diffusing an instantaneous and popular knowledge of any great national joyous event; not one in a thousand of the populace who are aware now that our future king, the eldest son of Albert the Good, was married on the 10th of March last—and these passages in our history ought to be marked—would have known it but for being enlightened on the subject by the illuminations, bonfires, torch-light processions, and fireworks, which that night lit up the whole country. Bonfires, torch-light processions, or fireworks cannot be allowed in the streets of our cities, but good illuminations can; and although we have far surpassed the time when George the Third's jubilee was held, and the streets were illuminated by oil lamps, or candles stuck in clay candlesticks, and here and there a transparency or a loyal motto punched out in card board, with a few candles behind it, yet there is much more room for improvement; we have now gas in addition to oil lamps, and brilliant cut glass drops, all at our disposal, and all suitable in their place. The noble façade of the Royal Exchange has been repeatedly and properly illuminated with oil lamps, and I hope will not be altered, either in the text or manner of display, for generations to come. The National Gallery appeared on the late occasion splendid in its brilliants, and the Admiralty in the display of gas. There will always be a diversity of feeling as to illuminations, while there will be also emulation and bits of humour, which add a zest to the affair. At future rejoicings, illuminating the centre of our west-end squares would tell very effectually, and relieve the streets; and were there fireworks also in the park, it would be a most acceptable addition. W

must collectively have our outburst of feeling, and I am glad to see your Society have appointed a committee to inquire how these popular rejoicings can be most artistically and effectively carried out, as what is worth doing at all is worth doing well. I am, &c.,

JAMES REVELL.

272 and 267, Oxford-street, W.

PATENTS.

SIR,—I never had, at any time, the most remote idea of ever being connected with Mr. Cole in the taking out of a patent for the application of magnesia to gutta percha—so that it should become thereby white, and applicable for shirt collars, &c. He evidently has mistaken what I meant as a joke for a serious idea of mine.

I am, &c., ROBT. H. COLLYER.

April 10th, 1863.

SEWING MACHINES.

SIR,—I much regret that I was unable to take part in the discussion that followed the able paper of Mr. Alexander, on the "Sewing Machine," last week. I must say that I was exceedingly disappointed at the tone and character of that discussion. Instead of receiving, as the Society of Arts had a right to expect, a fund of valuable information as to the order and character of the series of successive inventions which have at last resulted in the perfection of the sewing machine, the debate consisted of little more than contradictory statements as to whether such and such machine was invented or designed as a sewing machine, and whether or not the parties into whose hands these inventions fell, did, or did not, suitably reward the inventor. On some of these points statements were made which exhibit an astonishing amount of ignorance or a very wanton disregard of information which is patent to all who have taken any pains to become acquainted with the subject. It was stated by the last speaker, that Mr. Gibbons, who was associated with Mr. Fisher in the invention of 1844, had said very recently, that in that patent a sewing machine was not for a moment contemplated, and, *ergo*, that Mr. Fisher was not to be ranked as a sewing machine inventor. But when it is remembered that Mr. Gibbons had only a money interest in that patent, and that John Fisher was the sole inventor, then we have a right to accept John Fisher and his patent as the only credible witnesses; and his patent expressly describes his machine both for uniting fabrics and for ornamenting them. In this machine, which was undoubtedly intended for special application to stitching and ornamenting lace, Mr. Fisher employed the needle and shuttle for producing the lock-stitch, and the two needles for producing the knotted-stitch, the first being the identical features which Howe claimed to invent, and which he patented in America in his own name, and here in that of Mr. William Thomas.

There needs no other evidence of this, than the fact, that in connection with the litigation which took place in the years 1855 and 1856, Mr. Thomas found it necessary to disclaim, and that, too, avowedly for the reason that I have stated, first the use of needles and shuttles in the plural sense, and second, the use of a needle and shuttle at all, as part of the invention to be secured by letters patent. What, then, was Mr. Howe's invention? It is a curious circumstance that neither in Europe nor in America can two men—either lawyers or engineers—be found who will answer alike this question. To the present day it is loudly asserted in America that Howe was the inventor of the eye-pointed needle, and that this was the great step taken by him in advance of all predecessors. The same position was claimed for him here till the end of the year 1857, when in the action "Thomas *v.* Fox well," it was clearly proved that the eye-pointed needle was first used in a modification of the machine patented by Newton and Archbold in 1841, for the purpose of stitching the backs of gloves. In the summing up on that occasion, Dec. 1857, Lord Campbell said that "the great novelty in Howe's invention was the use of pressing surfaces to hold the cloth firm while the needle passed through, and to prevent the bagging that would otherwise take place." I will explain what these pressing surfaces were, so that those unacquainted with the technicalities of the sewing machine may properly understand them. In hand sewing the fabric is held between the finger and thumb close to the point where the stitch is made, so as to present a firm surface to the action of the needle. In the sewing machine the main bed plate of the machine represents the finger, and the little presser foot which holds the fabric down, represents the thumb—the two combined, form the pressing surfaces, and perform precisely the same functions as the human digits. In the original machine of Howe there was an adjustable rigid plate which held the edge of the work tightly against the outside of the shuttle race, the fixed plate acting as the thumb, and the side of the shuttle race as the finger. Was there, then, anything in prior use corresponding with this? In the machine of Newton and Archbold, before referred to, the material to be stitched, kid or leather, was held firmly down by means of a clamp which held the back of the glove in the best position for stitching, this clamp in fact being the thumb, and the surface below of course the finger. In John Fisher's machine, the material being light, a bent wire performed the same function—these two instruments illustrating, in fact, that which is now recognised in all sewing machines, that a varying pressure is required for different fabrics. The yielding or elastic presser now generally applied was not known then, nor was it invented by Howe. But because I do not admit Howe's invention in the needle, in the combination of the needle with a shuttle, or in the use of pressing surfaces, I am not disposed to admit the assertion of another speaker, who would simply award him the almost infinitesimal merit of adapting a tension to the under or shuttle thread. On the contrary, I think that very great merit belongs to the general combination which Howe produced, and it was at the time a most valuable step gained. The great defect which characterised it was the absence of an effective feed motion, or apparatus for carrying the cloth forward as each stitch was completed, and which, had Howe invented, he would have deserved the most lavish encomiums which have been showered upon him.

The position I take, then, is this, that the sewing machine is English, and not American, in origin; that all the different stitches known to the sewing machine, viz., the chain or tambour, the lock or shuttle, and the knotted, or, as it is sometimes called, the double chain stitch, were all English inventions, together with the leading instruments used in the production of these stitches, and that we are indebted to America only for some novelties in the combination, and particularly for the serrated or rough surface feed, which, and which alone, literally makes the sewing machine a general and practicable machine adapted for the workshop or the family. As this last invention was never even thought of by Howe, but was invented and applied in America during Howe's stay in London, I shall not further dwell on it here as it properly belongs to another epoch in the history of this machine.

Let us now see how this invention was treated in England, and how the inventor was treated. There is a common adage, that "One story is very good till another is told," and if juries could decide after hearing the plaintiff's case, no doubt the administration of our law would be greatly simplified. We were given to understand the other night that Howe, the great inventor of all that was original or valuable in the sewing machine, came over from America to England, and fell among thieves, who stripped him of his inventions, cruelly illtreated him, and sent him back again to the States naked and destitute — that a man of large means, who ought to have known better, who paid large sums for minor subsequent patents, so

much as £5,000 for one, "doled out a paltry £200" to the great originator. In other words, Howe was a martyr in England, and only in America realised the reward of his transcendent genius. There is not a tittle of foundation for this. The facts are these:—In September, 1846, Elias Howe completed his machine, and obtained his American patent, and in or about the following month despatched his brother Amasa with a machine to this country to dispose of the invention and the right to patent; for, let it be observed, he had not taken out a patent, which, under the law then existing, was in fact, beyond his means. Amasa Howe, on his arrival, called on Mr. Newton, the patent agent of Chancery-lane, and applied for introductions to parties who might be likely to purchase the invention. By him he was introduced to Mr. William Thomas, of Cheapside, an extensive merchant and manufacturer of stays and shoes. He described the invention, and asked £500 for it; but, like the woman in the Roman legend, declined to show it till his price was paid. Mr. Thomas refused to buy a pig in a poke, or to look at a thing he could not see, and Mr. Howe then, on an assurance that no advantage should be taken, produced his brother's invention. The machine was considered at best a very doubtful experiment. The offer was declined, and he took the machine away. Ten days or more elapsed, during which it was offered to a variety of parties without success; nobody would buy it. He then called again with Mr. Newton, but unlike the woman in the legend, he this time offered the whole invention for half the price—£250—and the bargain was closed, Mr. Newton taking out the patent under Mr. Thomas's directions, and in his name, in December, 1846. While the patent was being completed, Mr. Amasa Howe stated to Mr. Thomas that his brother Elias was anxious to come over and pay a visit to this country, to have the opportunity of seeing our large mechanical works, and that he would be very useful to Mr. Thomas as a mechanic, if Mr. Thomas would pay his expenses out. This Mr. Thomas agreed to do, giving fifty guineas for this purpose, and arranging to give him the salary asked, namely, two guineas per week. It was in March, 1847, when Elias Howe arrived in this country, an illiterate but ingenious mechanic. To give him a comfortable position, Mr. Thomas voluntarily advanced his salary to three guineas per week. After being in his new situation a short time, Howe was anxious to bring out his wife and family, and for this purpose Mr. Thomas advanced him eighty guineas, and after their arrival advanced Mr. Howe's salary again to four guineas per week. For nearly two years, Mr. Howe was employed in Mr. Thomas's factory, in Newington-causeway. He was partly occupied in applying his machine, with different modifications, to the manufacture chiefly of stays, but also of shoes, in all of which applications the great defect found was the absence of a convenient mode of feeding the work, and during the whole of that time Mr. Howe made no improvement on his original baster plates. The only improvement that was ever made and applied to the original machine was invented by Mr. Frederick Thomas, shortly after Mr. Howe had left, and consisted in the application of an endless band in lieu of the lengths of baster plates heretofore used.

Mr. Howe was also employed on several other machines, for services in connection with which, independently of salary, he received various sums, amounting in the whole to several hundred pounds.

During this period he received altogether little if any short of one thousand pounds, yet he got into debt, and his brother got into debt, for which he became security; and some time after he left Mr. Thomas's service, which he did on his own account, he was sued on some of those debts, thrown into Whitecross-street, and passed through the Insolvent Debtors Court. Most persons will think that a man with ordinary prudence would have saved money; at all events they will see in these facts the evidence that there can be no ground whatever for the assertion that he was improperly or even illiberally treated by Mr. William Thomas. Justice to that gentleman, who has been most improperly attacked, requires that these facts should be made known. The assertion has been made that Mr. Thomas agreed to give Mr. Howe a royalty on the machines sold. In contradiction of this is the evidence of the agreement itself, which is in writing, and does not refer to it, and the further statement of Mr. Thomas, that during the whole 14 years of the patent, neither Mr. Elias Howe nor his brother, even in word or writing, mentioned such a thing to him. It is most improbable that either of the parties ever thought of it, and Mr. Thomas, intending the machine for use in his own trade exclusively, would certainly not be likely to entertain it.

I believe the statements thus made cannot be controverted in any way. I may remark, before leaving it, that the Howe machine, advanced as it was on its predecessor, was yet so far from practical commercial value, that a year after Howe's return to America its use, little as it was, was abandoned, and for three years after that, or for six years after Howe's invention, not one machine was brought into the market for sale. For the invention, such as it then was, untried, a liberal payment was made, and to the inventor and for his services a very liberal reward was given. The patent had half expired before the efforts of subsequent inventors had sufficiently perfected the sewing machine in any of its forms to give any value to Howe's patent, while the machine itself, without those later inventions, could never have been anything more than an ingenious toy. Perhaps these facts will correct the misrepresentations that have so frequently been made on this subject, and dispel the illusions which exist in some minds as to the persecutions and misfortunes of the inventor of the sewing machine.

Your space and my time will forbid me, in this letter, going into the subject of the invention of the sewing machines subsequent to Howe's, but I shall be happy to do it in a future communication, and it will give the opportunity then of canvassing the comparative merits of the different stitches and the different constructions of sewing machines, a subject, perhaps, of more universal interest than anything which merely relates to the history of the invention.

I am, &c.,

W. N. WILSON.

144, High Holborn, W.C., April 13th, 1863.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...British Architects, 8.
Medical, $8\frac{1}{2}$. Dr. George Johnson, "On the Laryngoscope."
Asiatic, 3.

Tues. ...Civil Engineers, 8. 1. Discussion upon Mr. Brunton's paper on "The Scinde Railway." 2. Mr. Hawkshaw, "Account of the Cofferdam, the Syphons, and other works constructed in consequence of the failure of the St. Germain's Sluice of the Middle Level Drainage."
Zoological, 9.
Statistical, 8.
Pathological, 8.
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."
Architectural Museum, South Kensington, $7\frac{1}{2}$. The Very Rev. the Dean of Ely, "On the Ely Lantern."
Anthropological, $7\frac{1}{2}$.

Wed. ...Society of Arts, 8. Capt. T. E. Symonds, R. N., "On the Construction of Twin Screw Steam-Ships."
Geological, 8. 1. Sir R. I. Murchison, "On the Gneiss and other Azoic Rocks, and on the superjacent Palæozoic Formations, of Bavaria and Bohemia." 2. Mr. R. Lightbody, "Notice of a Section at Mocktree, near Ludlow." Communicated by Mr. J. W. Salter.
R. Soc. Literature, 4. Annual Meeting.
Archæological Association, $8\frac{1}{2}$. 1. Dr. Palmer, "On a newly discovered Roman villa in Berks, and an undescribed Camp in North Hants." 2. Professor Buckman, "On Roman Antiquities recently found at Corinium, and on Discoveries in other parts of Gloucestershire, and in Wilts." 3. Mr. Cuming, "On Peaked Hats."

Thurs...Royal, $8\frac{1}{2}$.
Antiquaries, 2. Annual Meeting.
Royal Soc. Club, 6.
Royal Inst., 3. Prof. Ansted, "On Geology."

Fri.......Royal Inst., 8. Mr. Alex. S. Herschel, "On Luminous Meteors."
R. Horticultural. Council, 11. Election of Fellows, and Ballot for Plants.
R. United Service Inst., 3. Mr. G. R. Burnell, "On the Progress of Military Science during the year 1862."
Sat.......Royal Botanic, 3¾.
Royal Inst., 3. Professor Max Muller, "On the Science of Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 3rd*, 1863.]

Dated 23rd March, 1863.

764. W. Johnston, Glasgow—Imp. in apparatus for lighting and heating.
766. J. Eyles, George-street, Portman-square—Imp. in cheffonier bedsteads.

Dated 24th March, 1863.

770. G. Davies, 1, Serle street, Lincoln's inn—Imp. in wrappers or papers for needles, and in machinery or apparatus for sticking needles therein. (A com.)
772. H. Williams, Portmadoc, Carnarvon—Imp. in machinery or apparatus for dressing slates.
774. J. Kirkham, Euston-road—Imp. in the manufacture of iron and steel.

Dated 25th March, 1863.

776. J. White, Finchley, Middlesex—Imp. in protecting the surface of the iron and steel of ships and all other structures, except that of cables, tanks, and boilers, while in contact with water, from decay; in preventing or abating and in facilitating the removal of foulness of ships' bottoms; and in giving a capacity of increased speed to ships.
778. J. Leach and J. Anderson, Ashton-under-Lyne—Certain imp. in machinery or apparatus for preparing and spinning cotton and other fibrous substances.
783. G. Stuart, Glasgow—Imp. in bleaching jute fibre.
782. R. Armitage, Huddersfield, and C. Senior, Dead Waters, near Huddersfield—Imp. in means or apparatus for stretching fabrics.
784. T. W. Gore, New Whittington, Derbyshire—An improved method of uniting earthenware, metal, and other pipes.

Dated 26th March, 1863.

788. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in treating steel and iron prepared by the pneumatic process.
792. W. Johnson, Warwick-square—Imp. in pocket books, purses, wallets and bill cases.
794. W. Tod and R. Paterson, Glasgow—Imp. in portable apparatus for working drills and other instruments.
796. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in furnaces or fire-places, and in apparatus to be used in connection therewith. (A com.)
798. W. Blake, Glasgow—Imp. in the manufacture of labels for luggage and other articles.
800. E. Easton, The Grove, Southwark—An improved application of hydraulic apparatus for lowering full casks and other goods, and raising empty casks or vessels.

[*From Gazette, April 10th*, 1863.]

Dated 28th November, 1862.

3194. W. Buller and J. H. Mugford, Bovey Tracy, Devonshire—Imp. in spur supporting rings for fixing plates, dishes, and other like articles in glost ovens.

Dated 16th December, 1862.

3364. H. Jorns, Tessin Grand Duchy of Mecklenburgh Schwerin—Imp. in clocks or time pieces.

Dated 4th February, 1863.

318. W. T. Weston, 4, Trafalgar square, Charing-cross—An improved spring catch or fastening applicable to windows and other useful purposes.

Dated 5th March, 1863.

628. W. Clark, 53, Chancery lane—Imp. in fire-arms. (A com.)

Dated 6th March, 1863.

641. H. R. Spicer, 3, Clement's-lane, Lombard-street—Imp. in protecting and preserving the bottoms and sides of ships and other submerged surfaces from oxidation, or fouling by incrustation, the attachment of barnacles, the action of animalculæ, or from any other like causes of injury.

Dated 17th March, 1863.

716. W. E. Newton, 66, Chancery-lane—An improved preparation for the cure of scab, foot rot, and other diseases of sheep and cattle. (A com.)

Dated 21st March, 1863.

757. E. Hartley, J. Clegg, T. Mellodew, and J. Mellodew, Oldham—Imp. in looms for weaving.
759. F. Applegate, Bradford-on-Avon, Wiltshire—Apparatus for making certain indications in railway carriages.

Dated 23rd March, 1863.

762. H. Hancock, 208, High-street, Southwark—A new combined range for making gas, cooking by gas, and lighting, especially applicable for ships.
763. J. W. H. Rothwell and E. J. Rothwell, Ramsbottom, Lancashire—Imp. in heating the feed water of steam boilers.
765. T. G. Grant, Royal Clarence-yard, Gosport—Imp. in ovens, and apparatus for heating the same.
767. W. Clark, 53, Chancery-lane—Imp. in agricultural apparatus. (A com.)

Dated 24th March, 1863.

769. J. Reilly, Barrack-street, Hulme, and W. Martin, Manchester—Imp. in lubricating horizontal shafting and bearings of all descriptions.
771. S. Healey, Elizabeth-street, Hackney-road—Imp. in the manufacture of zinc, and in the apparatus employed therein.
773. A. Topham, J. Topham, and J. Topham, St. Pierre les Calais, France—Imp. in the manufacture of ornamental twist lace, and in machinery used therein.
775. A. J. Cooke, Crown-court, Bow-street—Imp. in portable "Hooka" pipes.

Dated 25th March, 1863.

777. M. Phillipps, Dewsall, near Hereford—Imp. in the manufacture of iron or other metallic rod and wire, and in the machinery or apparatus employed in such manufacture.
779. J. H. Worrall, Bacup, Lancashire—Certain imp. in the method of producing surfaces in imitation of woods, and in printing therefrom.
781. C. Monson, New Haven, Connecticut, U.S.—An improved gravitation engine.
783. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of zinc, and in the apparatus employed therein. (A com.)
785. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of cords, ropes, and cables, and in machinery employed therein; applicable also to spinning, winding, and twisting fibrous and filamentous substances. (A com.)

Dated 26th March, 1863.

790. M. L. Parnell, 283, Strand—Imp. in the construction of locks, and in the method of adjusting their spindles.

Dated 27th March, 1863.

802. W. M. Morgan, Kidderminster—Imp. in coating metals, and in machinery and apparatus employed in coating metals.
804. J. Taylor, jun., Parliament-street, Westminster—Imp. in the construction and arrangement of the rain water pipes of buildings.

Dated 28th March, 1863.

808. B. W. Goode, St. Paul's square, Birmingham—A new journal axle, or bearing, particularly applicable to rolls.
810. R. Sims, Bedford Foundry, Leigh, Lancashire—Imp. in reaping and mowing machines, part of which imp. are applicable to horse works.
814. G. Thomas, 50, Chichester-villas, Kilburn-park—Imp. in window shutters and window blinds.

PATENTS SEALED.

[*From Gazette, April 14th*, 1863.]

April 13th.

2750. S. Chatwood.
2751. G. Harvey and A. Harvey, jun.
2752. A. F. Gallis.
2755. W. Loeder.
2766. J. Snider, jun.
2769. M. Cartwright.
2770. R. A. Brooman.
2772. E. H. C. Monckton.
2773. O. J. Showell & J. Showell.
2777. W. Wilson.
2779. J. Taylor.
2782. W. Pope.
2788. R. A. Brooman.
2797. E. Humphreys.
2798. H. Ransford.
2800. J. Robinson.
2802. E. Nelson.
2803. J. Summerton.
2804. H. Wickens.
2813. B. Lauth.
2815. J. Fuller.
2846. H. H. Kromschroeder and J. F. G. Kromschroeder.
2863. A. J. F. Vigneulle-Brepson.
2885. J. H. Johnson.
2921. J. Unsworth.
2930. G. Piggott.
2937. W. R. Bowditch.
2959. W. E. Newton.
3111. J. B. Edmondson, J. Carson, and J. Blaylock.
3282. G. Lowry.
3443. E. Stevens.
8. J. Jones.
121. B. Burrows.
199. R. Penney.
301. T. Raworth.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, April 14th*, 1863.]

April 7th.

898. W. E. Newton.

April 8th.

887. H. Bridle.
923. J. Hill.

April 9th.

895. L. J. Repelin.
899. J. Rigby & W. N. Norman.
924. A. Bamlett.
1064. J. Bullough.

April 10th.

935. M. A. F. Mennons.
991. T. G. Dawes.

April 11th.

905. T. H. P. Dennis.
960. C. Vaughan, W. J. Vaughan, and R. Vaughan.
1107. M. Bonnor.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, April 14th*, 1863.]

April 6th.

846. W. H. Gauntlett.

April 7th.

902. W. Fuller.
915. H. Y. D. Scott.

April 8th.

895. H. F. Forbes.
1124. H. Tucker.

Journal of the Society of Arts.

FRIDAY, APRIL 24, 1863.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary.*

The subscription of each member is limited to one guinea.

The following additional names have been received up to the 23rd inst.:—

Bax, Edward	1	1	0
Browne, Henry	1	1	0
Browne, William	1	1	0
Dell, William	1	1	0
Denham, William Graham	1	1	0
Hutton, Thomas	1	1	0
Jackson, Frederick Rowland	1	1	0
Jowett, John	1	1	0
Lemann, Francis H.	1	1	0
Mackenzie, John Henry	1	1	0
Mitchell, Rev. Muirhead	1	1	0
Palmer, Ebenezer	0	10	6
Palmer, Edward Howley	1	1	0
Sandon, Viscount, M.P.	1	1	0
Smith, James	1	1	0
Tanqueray, Charles	1	1	0
Tansley, Alfred John	0	10	6
Thompson, Harry S., M.P.	1	1	0
Thorne, Augustus	1	1	0
Welch, John K.	1	1	0
Williams, H. R.	1	1	0

COMMITTEES OF REFERENCE.—EDUCATION.

The Committee on Education met on Friday, the 17th inst. Sir Thomas Phillips, Chairman of the Council, in the chair.

The Chairman explained the objects of the Committee, and invited members to offer any observations upon what the Society had already done to promote education, and to suggest any further steps which it might appear desirable should be taken in this direction. He would call upon his friend Mr. Chester to make a few remarks.

Mr. Harry Chester said it was rather the idea of the Council, in calling this meeting, to get suggestions from those who were not members of the Council. All present would no doubt be aware of the operations which the Society had of late years carried out with regard to education. This was not a new field to them. He found, from the earliest period of its history, the Society was in the habit of offering encouragement to education. Mr. Chester proceeded to describe the present plan of the Society's operations with regard to adult education, and the organisation which had been carried out for the Society's examinations, and he went on to remark, that the success of the measures they had taken had been, he thought, considerable. There had been a gradual increase in the numbers who availed themselves of this system of examination. They had of late given a great deal of attention to the establishment of Elementary Examinations by the various Local Educational Boards, so that children between the age of 12 and 16, and older persons, whose early education had been neglected, might be taken up at a low point of education and carried on to a higher. There was one great difficulty in connection with this system, which was, that it was very complicated. He confessed one of the greatest services that could be rendered to the system of the Society's Examinations would be a suggestion as to a mode in which the plan could be simplified. It was, however, of importance not too much to centralise the operations, but rather to enlarge the growth of Local Boards in all parts of the country, and that they should depend upon the Society of Arts no more than was necessary to give vitality and success to the system. Looking at the subject in that point of view, he thought much good would result from an extension of the plan of central unions of institutions as had been done in Yorkshire and South Staffordshire, and under the exertions of his hon. friend, Mr. Best, in the southern counties, from which representatives were appointed to sit upon the Central Committee. In that manner all the various bodies throughout the country might be represented, and the whole thing, he thought, much simplified. They might thus have but one set of previous examinations, and one set of final examinations. He might mention that this year an Association, called the Metropolitan Association for Promoting the Education of Adults, had been established in London, which was "in union," as so many Institutions were, with the Society of Arts. This Association had introduced a new feature into their examinations, which he considered was of value. The Society of Arts, representing as it did persons of all religious persuasions, could not conduct any examination in religious knowledge. It had, however, occurred to the Metropolitan Association to make application to the Bishops of London and Winchester to hold examinations on religious subjects, and they had consented to do so. This, like all the other examinations, would be of a voluntary character, but those who desired it, having previously obtained a certificate from the Society of Arts, or some body in connection with it, might present themselves in this class of examinations, and he considered this an important addition to the system. This could not, however, be done by the agency of the Society of Arts, but by the local associations themselves.

Dr. Waddilove had not himself more than a general knowledge of the operations of the Society in connection with education, but he presumed they consisted chiefly in examinations. The examination was no doubt the culminating point as the test of education, and it afforded an inducement to people to educate up to that test. He thought it desirable not only that they should have these examinations, but that the Society should lay down some general line of education to be adopted by the persons they intended hereafter to examine, which should serve as some sort of outline of the course of education which was considered desirable.

Mr. Chester said that was already done to a certain extent. The programme issued by the Society contained twenty-nine subjects for examination, giving, he thought, sufficient scope for variety, and allowance for diversity of

tastes. They did not require, as in the universities, that a man should go through a complete course of education; but it was open to him to choose any four subjects out of the twenty-nine on which he desired to be examined. By this means he went on year by year adding to his store of knowledge, either by the further study of the subjects on which he had been previously examined, so as to qualify himself for a higher certificate, or by entering upon fresh branches of study.

Rev. R. Whittington thought that the Society of Arts had gone as far as it could in suggesting the course of education that should be adopted. The object the Society had in view was not to teach, but to test education. Mr. Whittington then referred to some matters of detail in the arrangement of the Examinations, and a conversation took place, in which various members of the Committee took part.

Mr. Watkins inquired whether the Society's system of Examinations was confined to the male sex?

The Chairman replied that not only were females allowed to come up for examination, but last year a lady was successful in gaining the highest prize in English erature.

Mr. Watkins thought that the present system of female education in this country was extremely defective. If the Society offered a special prize for females in the higher branches of knowledge, it would tend to the welfare of education generally.

The Hon. and Rev. S. Best said the suggestion just thrown out was a most important one, because they must look upon women as the future educators of the country. He approved of the suggestion of a special prize for the encouragement of the education of females.

Dr. Yeats said, as a member of the Board of Examiners of Queen's College, he must take exception to the sweeping condemnation that had been passed by a preceding speaker upon female education in England. At Queen's College there were ample opportunities for females acquiring a good education, and the influence of that institution ramified in all directions.

Mr. Watkins said he was quite aware of the admirable system pursued at Queen's College, and he excepted that institution from his remarks; but in most private schools there was no system of education at all.

Dr. Yeats, after giving some account of his own educational experience both in this country and abroad, said that the difficulty with which he had had chiefly to contend was one which it seemed to him the Society of Arts might greatly assist in overcoming; it was that of interesting the parent in the business of the child. He thought branch associations might be formed in every town and village, which should associate themselves with the great society, and be in frequent communication with it, especially upon this one object of education. He thought the important thing in education was to find out what the parents themselves wanted. Dr. Yeats, in conclusion, suggested that the offering a prize for a good history of industry would be worthy the attention of the Society.

After some remarks by Mr. J. M. Wade, and the Rev. R. Whittington,

Dr. Yeats expressed his opinion that much good would be done by the larger distribution of the *Journal* of the Society throughout the country. He had been told by two humble inventors of useful articles that if they had access to the *Journal* it would be of unquestionable use to them and to their families.

Mr. George White urged the importance of making the educational operations of the Society more largely known, particularly in the metropolis.

Mr. Chester, returning to the subject of the encouragement of the education of women, said that he thought much might be done by the establishment of a Central Board for testing their knowledge, and granting them special certificates.

Mr. James Heywood agreed with the importance of the subject of the improvement of female education in this country. He recollected on a late occasion a lady, who was a student in the London University, wished to matriculate for degrees, and upon a division of the senate on the question as to the admission of females to degrees, the numbers were 10 for, and 10 against; and Earl Granville, who was the chairman on the occasion, gave the casting-vote against the proposition, so that the lady in question was not admitted to degrees; but, an equal division of votes having taken place, he did not despair that the question might be revived with a different result. He agreed with the suggestion of Mr. Chester, that they might have a Special Board of Examiners for females.

Rev. James Ridgway thought there was some danger of falling into the error that the whole object of education was to push the intellect to the furthest possible extent, without thinking how that education might act practically upon the future prospects of life, and though the universities might be useful for females in some cases, it was to be considered how far such education as was there imparted was calculated to render them useful to their fellow creatures in after-life.

Rev. R. Whittington wished to state that for a small fee women could be examined at Queen's College, where certificates almost equal to degrees were given which had their proper value in the educational world. He did not at present see that examinations of females by the Society of Arts would afford advantages over what was now done at Queen's College.

The Hon. and Rev. S. Best believed that neither Queen's College nor King's College embraced the classes to whom the Society's examinations were directed.

Rev. R. Whittington said that for a fee of 5s. any person could be examined at Queen's College.

After some further conversation the proceedings terminated.

NINETEENTH ORDINARY MEETING.

Wednesday, April 22, 1863.

The Nineteenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 22nd inst., Rear-Admiral the Hon. Joseph Denman, F.R.G.S., in the chair.

The following candidates were proposed for election as members of the Society:—

Baxter, Richard	14, Porchester-square, W.
Cook, Dutton	4, Raymond-buildings, Gray's-inn, W.C.
Costa, Michael	54, Eccleston-square, S.W.
Cox, Edward	102, Chancery-lane, W.C.
Davidson, Septimus	22, Basinghall-street, E.C.
Dean, Samuel	5, Cleveland-gardens, Hyde-park, W.
Denison, Alfred	6, Albemarle-street, W.
Dicker, John Campbell	10, Craig's-court, Charing-cross, S.W.
Harwood, H. Harwood	29, Cleveland-square, Hyde-park, W.
Hayes, George, M.D.	66, Conduit-street, Bond-street, W.
Lake, George Walter Gidley	13, Finsbury-place South, E.C.

The following Candidates were balloted for and duly elected members of the Society:—

Benbow, Vernon	69, Russell square, W.C.
Carter, Robert	41, Victoria-street, Westminster, S.W., and The Grove, Epsom.

Cavell, Edward Strutt ...	6, Great Coram-street, and 5, Gray's-inn-place, W.C.
Child, Henry William Grace	27, Scarsdale-villas, Kensington, W.
Heaton, Clement	24a, Cardington-street, Hampstead-road, N.W.
Mappin, Joseph C..........	Clapham-park, S.
Ridsdale, Joseph	Montpelier House, Tufnell-park, N.
Tunstall, Wm. Croudson.	Gloucester.

The Paper read was—

ON THE CONSTRUCTION OF TWIN SCREW STEAM-SHIPS.

By Commander T. E. Symonds, R.N.

It may be urged, and with some show of reason, that the subject I have chosen is too comprehensive, too full of matter of vital importance, to be treated in the limited period permitted by this Society, but, while perfectly aware of this, as well as of my own incompetency to deal with it as it deserves, I shall endeavour to treat it generally, dwelling on those points which, as a seaman, I consider merit a prominence that has not hitherto been given to them, and particularly calling attention to a system, the practical application of which has of late borne out all I have advanced in its favour, and that bids fair to revolutionise the present method of propulsion.

Being a seaman, and not presuming to be, in the fullest acceptation of the term, a naval architect, there are those who I know will, on principle, object to my thus venturing on a province they hold to be exclusively their own. However that may be, I consider it a legitimate undertaking for a naval officer, who has given the subject much attention, to venture opinions founded on practical results that have come under his observation, especially at a time when shipbuilders themselves are so much at variance on the form, construction, and system of propulsion which is best to be adopted in the future.

Previously to entering upon the subject of my paper, I am desirous of stating that the principles of construction I am about to explain are those of a man well known to this Society for the distinguished services he has rendered his country. I refer to my honoured friend, the veteran engineer, Mr. Richard Roberts, to whose genius we are already indebted for many of those machines which have contributed so largely to the perfection of manufactures, whether dealing with the surface of the hardest metal or with the most fragile fibre. It has been my privilege to be associated with him in carrying out his principles of constructing twin screw steam-ships, a system I have long believed in, but never saw a method of properly applying, until I became acquainted with his plans, to which I have made such additions and alterations as my professional experience led me to believe were necessary.

I must beg to be understood that I do not claim, either for Mr. Roberts or myself, the invention of propulsion by two screws, but simply a method of applying them by which their greatest useful effect may be developed.

Notwithstanding the marked improvement that has taken place in shipbuilding during the last quarter of a century, we do not appear to have made that progress in the application of the screw as a propeller which might have been anticipated. Nor have we improved the manœuvring and steering qualities of our ships in the slightest degree, although the necessity for it increases with the larger dimensions on which they are now constructed.

Whether or no this proceeds from the absence of practical acquaintance with the contingencies which seamen alone can properly estimate, it is an undoubted fact that many of our large ships are still sent to sea in most other respects perfect, but lacking those vital qualities on which their successful performance mainly depends, the absence of which is seldom strikingly manifested till the hour of peril arrives, and the oft-repeated tale of disaster conveys to us the imperfection of existing arrangement. It has I think been unwisely recommended to increase the area of rudder considerably, and apply steam or hydraulic power to actuate it, thus effecting by overwhelming force that which may be attained by turning the propelling power to account as a steering agent, which proceeding from the source of motion, must act more directly and suddenly on the ship, as in the twin screws. I believe we have arrived at a point beyond which it would be unsafe to increase the size of the rudder.

We have been engaged during the last 20 years, and are still occupied, in testing the power of the screw, but we have comparatively ignored the question of its proper position in a ship whereby to secure its most useful effect as a propeller, and to enable it to fulfil its duties under all circumstances of difficulty in which a ship may be placed.

In one of the latest reports of these trials we are reminded of the impossibility of such a ship as the *Emerald*, when propelled by a single screw, being able to enter even such a harbour as New York, and by the aid of her own powers turn and go out to sea again, under ordinary circumstances; what would be her fate if placed in a position of danger requiring that nicety of manœuvring which could alone save her from destruction, and which the costly character of her equipment entitles us to expect?

In these tests of the screw we have learned much that is interesting, and one important fact, which constantly recurring accidents should have deeply impressed on our minds, namely, that a few turns of a rope's-end will fix the screw, as in the *Royal Charter* and many other cases, and a first-class ship with all her magnificent engines become helpless on the water, so far as her machinery is concerned, and unless under a very different rig to that now applied to our ships of war, equally so under canvas, in a military point of view, some of them taking twenty minutes to stay and from thirty to forty to wear.

If ships are still to retain their sails and to be efficient men-of-war, they must do so to a greater extent than at present; some remedy must be found for this defect, otherwise a very few minutes in action will decide their fate.

In addition to the manifold imperfections attending the present method of fitting the screw, which have received many illustrations in our war ships of late, there are practical difficulties of construction (which I have constantly urged) that are now beginning to be admitted. For instance, the enormous and costly forgings for the stern-posts, weighing some 40 to 50 tons each, taking a year to prepare, and then perhaps found faulty at last, as was the case in one instance, the difficulty of securing these massive forgings to the plates of the stern, and the imperfect character of the fastening when fixed there, the great unsupported weight at the extremity, already considerably weakened by the screw aperture, all form objections of a grave character that cannot be overlooked.

The exposed condition of the after stern-post, rudder, and screw to injury from shot, rams, and other causes, and the liability of the screw to foul, are points meriting more attention than they have received. It is yet an open question how far the stoppage of the *Orpheus's* engines may be attributable to the after stern-post striking the ground, thereby throwing the screw shaft out of centre. No practical plans have hitherto been devised for their protection. Those which have appeared involve either a malformation of the after body, as may be seen in recent models, which will incur loss of speed, or auxiliary appliances of a complicated character which are calculated to increase rather than diminish the evil. I have on many occasions recommended the form of propeller shown in the diagrams, which is decidedly non-fouling. It is lighter, and will, I believe, on experiment, prove quite as effective as any of those forms now used. A model of this propeller is on the table, showing a method by which it may be readily withdrawn without disturbing the main shaft. Furthermore, I contend that, no matter how perfect the form of the ships may be, the position of the

screw in the centre of the run is not calculated to develop its greatest useful effect as it works in the disturbed water or eddy caused by the passage of the ship, and, being so near the surface, is constantly lifted out of the water, which involves loss of power, and causes vibration by the unequal action of the upper and lower blade. Apart from the causes ordinarily considered to produce vibration, I believe that much is due to the resistance met with by the after stern post in its passage through the water at high speed, which produces a tremulous motion. This may be noticed in a minor degree in a post standing in a swift current. This primary cause is greatly increased by the action of the screw in throwing the water against the top and bottom of the rudder twice in every revolution. In support of this view, I may mention that in the *Prince Albert*, and other single screw steamers having their rudders before the screw, no perceptible vibration takes place. The screw aperture in the dead wood being dispensed with in these vessels, their steering power is as perfect as in a sailing ship.

Vibration is by no means the least of the many serious objections to the single-screw system, and is perhaps the strongest argument that can be adduced against building wooden ships, as it causes them to leak to such an extent as to necessitate constant caulking and repairs. The *Orlando* and several of our large wooden frigates furnish ample proof of this; in the former, the vibration was of such a character as absolutely to endanger the masts and threaten to throw the men out of the rigging. Iron ships are by no means exempt from its destructive effects, as is frequently seen in their loosened rivets, and other unmistakeable symptoms. Another objection to the single screw is its tendency to throw the ship out of her direct course, by its acting to the right or left, according as the screw is right or left-handed; this involves a corresponding opposite action of the rudder, which must reduce speed, rudder and screw being in conflict. This is entirely obviated in the twin screw system, as the screws being right and left they turn in opposite directions, and thus correct that deviation from a right line which either would cause separately. Having thus considered some of the drawbacks attendant upon the single screw system, I will, with your permission, enter upon the application of "Twin," or as they are sometimes called, "Double Screws."

We are, I believe, indebted to Captain Carpenter, R.N., for first introducing the plan of working two screws, for which he obtained a patent. In this instance however, and until a date subsequent to Mr. Roberts' invention, they were driven by the same engine, and, therefore, could not be used independently, the leading and most valuable feature of the principle being entirely overlooked. This Mr. Roberts supplied by the simple application of separate and independent engines to each shaft, by which the screws are driven independently of each other, and a perfect steering power is thus obtained with the ship going either ahead or astern, by increasing or decreasing the velocity of either screw without any assistance from or use of the rudder. By reversing the action of one screw the ship is turned round on her centre (*i.e.* in her own length), if necessary, as upon a pivot, the ship thus becoming a turn table, unerring in its action and not liable to disarrangement.

The possibility of executing these most important manœuvres with twin screws was much questioned, if not absolutely denied, by many scientific and practical men, when I read a paper on the subject at the Royal United Service Institution, in March last year, the substance of which was published in the *Journal* of this Society in July, 1862. The statements I then made were the result of practice, which has since been satisfactorily confirmed in the presence of many distinguished and competent persons on board Messrs. Dudgeon's celebrated twin-screw vessels *Flora* and *Kate*, whose performances have convinced all but the ultra-sceptical, and may be said to have introduced a new era in ocean steam navigation in this country.

It may be interesting as well as instructive to learn that this success in the twin-screw system is not confined to our side of the Atlantic. Numerous vessels of the navy and mercantile marine of America are now fitted on this system; in fact, those destined to act in narrow waters are considered comparatively useless without it. In a recent reliable account from America, the loss of the iron-clad ram *Indianola* is entirely attributed to her "inability to manœuvre," falling an easy prey to two small gun boats having that power in a high degree. The writer states, "Now that she has gone we see her defect plainly enough, and war has taught the lesson, she could not control her position. The two small vessels could run round her, while she could not turn; they could thus ram her first on one side, then on the other, till the mailed giant was beaten to death, while at any time one blow from her prow would have crushed both of her assailants could she have got at them." He further asks, "How are we building our ocean rams? Have they the means of turning at pleasure? If not they are likely to fall victims to smaller craft, as did the *Indianola*." A vessel 400 feet long cannot be turned in narrow waters with a single screw propeller, and would certainly be destroyed by a shot-proof ram of 100 feet, which could rapidly change its position.

The fate of the *Indianola* has thus been presented to us as a warning, in almost the same words, and in the manner I predicted last year, and carries with it the conviction that one of the first conditions to be obtained in a ram or any other war ship is power to manœuvre at will, for without that power, however great and strong otherwise, she is next to useless in the presence of an enemy having it.

The *Naugatuck*, American gun boat, of 100 feet long by 20 broad, drawing 5 feet of water ordinarily, 7 feet when settled in the water, by filling her cells, at public experiments repeatedly turned end for end in one minute 15 seconds. She is fitted with twin screws, and had a 6¼ in. Parrot's gun, throwing 100lb. shot, on a fixed carriage. There being no possibility of moving the gun laterally, except by moving the vessel, this was done with perfect ease, the vessel becoming the turn-table, actuated by the two screws, by which means accurate line firing was made.

Another instance from the same quarter is that of the *John Nelson*, a twin screw steamer, 225 feet long, used for transporting the mail trains across the Delaware River. This vessel turns end for end at every trip, in order to deliver the cars at the same end they entered, performing the manœuvre in a strong current often choked with ice, in from 1 min. 25 sec. to 1 min. 30 sec. with the utmost ease and precision. I might add numerous other instances to prove the invaluable properties of this method of propulsion, as adopted in America, did time permit. I must not, however, omit to mention, that the celebrated Stephen's Battery, and many gun-boats now building with fixed turrets, are being fitted with twin screws worked by separate and independent engines.

Although the method hitherto adopted for fitting twin screws has been productive of great success, as lately proved in this country by the *Flora* and *Kate*, I am satisfied that the system has been by no means fully developed in those vessels. They were confessedly not calculated for high speed, though the speed they did attain was high in comparison to the power employed, and they were too narrow to produce the greatest power of manœuvring due to the system. The diagram represents the after body of a single keeled vessel fitted with twin screws as in the *Flora*. The propeller shafts are led through the quarter of the vessel in pipes supported at their after extremity by V brackets bolted to the quarters and intervening dead wood. In these brackets are placed the bearings, the screws being attached to the shafts in the ordinary manner abaft the brackets.

This method I consider open to the following objections:—

1st. The shafts are liable to injury on coming in contact with floating wreck. In rising and falling in a sea they will be likely to buckle and vibrate, the unsupported length being considerable.

2nd. Wreck, weeds, or cordage getting between the pipes and dead wood can hardly escape being retained there by the brackets, and thus foul the screws or injure the shaft. Lastly, these outrigger brackets must present great obstruction to propulsion and create vibration, which will be increased by the arms of the screws passing them at 100 revolutions. This will soon produce its effect on the rivets securing the brackets to the bottom.

If it be deemed advisable to apply twin screws to existing single keeled ships the method I propose will materially reduce these objections. The pipes or trunks in this vessel are of considerable diameter at their junction with the quarters, gradually diminishing to the diameter of the boss of the screw at the after extremity. These trunks are connected with the bottoms by a strong vertical web, which supports the trunk through its whole length (instead of merely at each end), thus giving great strength and rigidity; the screw-boss fits closely to the end of the trunk which overlaps slightly to keep out small ropes, &c., and being of rather less diameter than the trunk, the water already displaced by the ship flows direct to the blades in an uninterrupted volume. The blades of the propeller being calculated to throw off objects, and there being no intervening obstruction, as in the case of the "out-rigger brackets," the risk of fouling or injury is materially reduced. The four-bladed spiral propeller shown will have a continuous and regular action on the water, tending to reduce the vibration observed in those of two and three blades, as recent experiment has proved.

Although very good results may be attained by this application of twin screws to single keel ships of the present form, the intervening dead-wood is a decided obstruction to their perfect action; it divides and materially reduces the column of water coming to the inner arms of the screws, increases friction, and the water being thrown off by centrifugal force against the dead-wood, gives a series of shocks that will tend to produce vibration. It also necessitates a leaner after-body than is required for the clear delivery of the water, thus neutralizing one of the advantages I claim for the twin screw system. By placing a screw under each quarter, in lieu of the centre of the run, the screws are taken to the water instead of leading the water to them, as in the single screw; you are thus enabled to give a fuller, more buoyant, and stronger after-section, that will give a support aft, which will prevent squatting, or undue immersion at high speed, and contribute to easy motion, whether in pitching, sending, or rolling.

The diagrams and models on the table illustrate the method by which I propose to fit these screws. You will observe that the dead wood, stern post, and ordinary rudder, are entirely dispensed with, the screw shafts being led through trunks connected to the quarters by vertical webs, similar to those I have previously described. Under these trunks are fitted two cellular keels (*a*) of any required width and depth, running under each bilge nearly the whole length of the bottom; these keels will contribute very materially to the security of the trunks, the rigidity of the after-body in the wake of the screws, and to the general strength of the bottom, which they will defend on taking the ground and decrease rolling. Under canvas they will give great stability and weatherly qualities, acting in fact as lee boards. At their after extremities are fitted two rudders, the united area of which may be in excess of the immersed portion of the ordinary rudder in a single keel ship. These subaqueous rudders act in unison or separately as may be required; being constantly submerged they are not liable to injury whether under weigh or at anchor, as is the case in the ordinary rudder. I may here mention that the rudders of the *Royal Albert* and other ships, when lying at anchor in the Crimea, was so injured by rolling as to necessitate its being unshipped. The perforated rudders shewn in the diagrams are similar to those used with great effect by the Chinese. They reduce the lateral pressure without injuring the steering power, less power being required to steer with.

It will I think be admitted that in this method the water will have a more undisturbed passage to the screws in all directions than in the single keel ship with the dead wood, and that being undisturbed, and the screws having more space to work in by the absence of the dead wood, their efficiency will be enhanced whether in propelling or manœuvring, the area of resistance to turning being decreased by the absence of the dead wood. The rudders being before the screws are acted on by an undisturbed current of water passing along the keels. Screws and rudders are thus quite independent of each other, respectively producing their maximum effect, both being immersed at such a depth as to avoid most of those dangers to which the rudder and propeller of a single screw ship are liable from floating wreck, shot, and other contingencies. The screws being deeply immersed would be nearly if not quite below the surface at light draught, thus obviating the necessity for trimming by the stern to immerse the screw, a plan of necessity adopted in many light merchant ships, which destroys their other sea-going qualities.

In this construction a duplex system is observed throughout, the ship could not, therefore, be deprived of the services of her propelling or steering power at one blow, for even if one screw should be disabled in action, a contingency not very likely to occur from their position and deep immersion, the other would still remain to propel the ship, which it has been proved can be done effectually, the *Flora* having made a portion of her passage to America working her screws alternately. If the rudders were carried away, which is even still more unlikely, the steering power would remain perfect by means of the screws.

The absence of these properties constitute the chief defects in our war ships as steamers, most of which require from 8 to 10 minutes to complete a circle of from 10 to 20 times their length in diameter, incapacitating them from manœuvring rapidly in the face of an enemy at sea, and totally preventing the performance of such evolutions as would be required to make them efficient in narrow waters, even if their great draught permitted them to enter; whereas ships of moderate draught of water, fitted on the twin screw principle, having high speed, and the power of turning and manœuvring which has been proved, would always be ready for service in shore or at sea, where the present class of ships with the single screw, and attendant heavy draught of water, would be comparatively useless. It is very obvious that if the requirements of our iron clad leviathans are to go on increasing in the proportion we are sometimes told, we must have increased displacement, and as the limit of both length and depth are well nigh exceeded, increased beam is the only alternative. With increased beam the difficulties of the single screw system multiply, and the advantage of the twin screws will be more thoroughly developed.

I am not, however, disposed to believe that such enormous ships are the best, and infinitely prefer one of moderate size that can be readily handled. Still more am I opposed to returning to the long, narrow, deep style of ships which I hear sometimes advocated, well knowing that such ships can never make good sea boats, even if they are found to roll more easily than wider ships, which I much doubt if the latter are properly constructed and weighted.

Heavy draught of water must be admitted to be a great drawback to a war ship. It is felt almost every day at our naval ports, where millions will have to be expended in suiting them for these ships, whereas ships equally, if not more efficient, might be built, for which the present depth of water would be ample.

One of the most important features in this system is its bearing on the question of "broadside batteries." By it, existing ships having broadside guns may be made to accomplish all that is claimed for the cupola or turret system,

without altering form or rig, and without risking the loss of their sea-going qualities, a point that to my mind has not been satisfactorily disposed of in any argument I have yet heard on the cupola system, but that is of vital importance if we are still to rule on the wave.

Among other recommendations which the twin screw system offers both for ships of war and merchant vessels, is the division of the engine power, substituting lighter, less costly, and more manageable engines, for those ponderous machines which, while we admire them for their excellence of workmanship, cannot fail to suggest their unsuitableness for sea-going purposes.

These duplex engines also lie lower in the ship, and thus tend to counterpoise the armour plates, and their weights are also more equally distributed over the floor than with a single pair of engines.

Apart from the other advantages I have claimed for this system, it is superior in an economical point of view. The stern post of a ship costing £250,000 is estimated at £6,000, which is nearly 2½ per cent. of her total value. The weight and the difficulty of connecting it firmly with the plates of the stern, the time it takes in preparing it (in some instances twelve months), and then, perhaps, faulty, present formidable objections, whereas, in the form I advocate, the whole structure is composed of plates of equal strength readily put together, which, as a whole, forms a lighter and stronger fabric, that, if required on an emergency, might be half completed ere the massive forging was out of the smith's hands.

The ship thus relieved from these enormous weights at her after extremity, will be better calculated to carry her armour plates, and prove a better sea boat. Not only are the before-named weights dispensed with in this system, but those still necessary are removed further from the extremity, and, therefore, bring less strain on the after body, and are further removed from danger of whatever description. The weight of both the screws I advocate would be about half that of the *Warrior's* single screw.

Although not favourable to using lifting screws, (especially as they may be made non-fouling)—many objections having been raised to the twin screw system for sea-going ships from the supposed impossibility to lift them—my attention has lately been turned to that branch of the subject, and I have the pleasure on this occasion to offer to your notice a plan which, when matured, will, I anticipate, prove effectual. I produce it now in its crude form, not for an instant doubting that your friendly criticism will furnish me with valuable hints towards the accomplishment of my object.

The diagrams on the wall represent a longitudinal and two vertical transverse sections of a ship of 6,500 tons, having 62 feet beam, 400 feet on the water line, and 23 feet draught of water, showing the method of lifting the screws.

In constructing ships according to this plan, I insert two transverse bulkheads across the stern part of the ship, the aftermost of these bulkheads being immediately before the screw, and I form a well-hole for receiving each screw under the counter and abaft the after transverse bulkhead.

For the purpose of enabling overhung screws, according to this plan, to be raised vertically, I fix each screw upon a short length of shaft which is supported by, and free to revolve in, a long bearing formed by two half-carriages which, when brought together, form a tube which may be filled with lignum-vitæ strips, or other bearing or wearing surfaces. These half-frames, when combined, form the carriage, which, sliding in a vertical frame or guides between the transverse bulkheads, enables the screws to be raised vertically, so that the ship may sail without the obstruction offered by the screw propeller. Each screw may be raised separately. The inner end of the short shaft, upon which the screw is mounted, may be filled with the ordinary cheesehead coupling.

The withdrawing the screw from the water, or the lowering, may be effected by means of chains and pulleys, or any other of the well-known mechanical means may be adopted for that purpose. The foremost of the transverse bulkheads is fitted with a stuffing-box for the screw shaft, and the cheesehead coupling projects therefrom.

The apertures for the screws are fitted with flaps or shutters, opening outwards, or they may be made to slide for the purpose of closing the opening at the bottom of the screw hole, so as to insure a clear delivery of the water, whether under steam or sail.

The overhanging end of the screw or one of the blades may have a hole formed therein, for the purpose of enabling the screw to be fished, to assist in lifting it.

For the purpose of withdrawing the overhanging screw horizontally from off the screw shaft in twin screw vessels I form the after end of the screw shaft in the following manner:—I make the shaft at the outer end sufficiently large to enable it to be bored for the purpose of receiving the shank of the screw, or a short length of shaft upon which the screw has been fitted; and by means of a gib, key, or cotter, passing through key holes or slots formed in both the screw shank or shaft and the hollow part of the main shaft within the stuffing-box, or between the outer and inner bulkheads or forward of the stern bearing, the key or other means of securing the overhanging screw in its place may be withdrawn and the screw be released.

By the arrangement of bulkheads, forming the after termination of the hull in the manner described, I am enabled to give additional strength to the ship as a structure; and by the arrangement and disposition of the stern parts externally, and of the rudder in double keeled vessels, I am enabled to avoid the necessity for any stern-post, upright, or framing piece abaft the screw propeller, or any opening or void, such as exists in ships of war and other vessels, between the fore and after stern posts, which impairs the steering qualities of the ship.

In iron screw vessels, having double keels, I place a rudder in the line of each keel, and nearly in a line with each screw shaft, and I connect the tillers together so as to enable them to work simultaneously with one wheel or they may be readily disconnected, for the purpose of being worked separately.

The remaining diagram represents an adaptation of this plan of lifting to a single keeled ship, such as the *Warrior*, fitted with twin screws, and the same ship fitted with a single screw. In the former the screws will be each 15 feet diameter, will be immersed 8 feet, and four feet clear of the bottom, each weighing about 5 tons; whereas, in the latter, the immersion of the screw is only 2 feet, having 1 foot clearance at the bottom, and weighs upwards of 20 tons.

This ship is fitted with two cellular keels, and the continuous cellular bottom composed of longitudinal beams or stringers with transverse plates forming the cells as recommended by Mr. Roberts in 1852, and now generally adopted. This cellular bottom is worked up into the engine frames and forms a network of great strength, which, with the assistance of the keels, will bid defiance to any strain that may take place in that part of the fabric, the keels protecting the bottom plates from injury on taking the ground, and thus removing one of the strongest objections raised against iron construction. The keels will also keep the ship from falling over on taking the ground, whereby her guns may be fought as though afloat, and will allow the floors to be made flatter, the bilges being supported by their broad surfaces, which cannot be done in single keeled ships having rising floors like the *Warrior* and other large vessels, which only add to their weight and draught without any corresponding advantage. Docking and repairs will also be expedited by this construction, and at a reduction of 3 feet 6 inches to 4 feet draught, as compared with the *Warrior*, the present depth of water in docks will be available.

To resist the strain on the upper side of the ship—a point that many are of opinion has not been sufficiently cared for—and to protect the ship to some extent at least

from vertical fire, the upper deck is also cellular, the cells being filled with a material of a non-inflammable character, harder than wood, that will not splinter, the whole being secured with through bolts and rivets as shown. With this material I propose to back the armour plates. If there is a demand for it, it can be produced in any quantity at a less cost than wood. The box girders, 2ft. deep on either side of the upper deck, are calculated to withstand any pressure that is likely to be brought on the upper part of the ship. These run fore and aft, gradually decreasing in size at either end.

The coal bunkers are formed of longitudinal bulkheads, vertical to and parallel with the keels (on which they abut), running fore and aft the ship till they meet the sides; these compartments are divided into cells of 12 ft. 6 in. square, by the main and other athwartship bulkheads; they will materially conduce to the strength of the structure, and form an important element in the unsinkable character of the ship, for in the event of either cell being perforated by a shot or a blow from a rock or a ram, that compartment alone would be filled. It might be readily repaired by the old and simple alternative of passing a thrummed sail over it from outside; on the water being pumped out by a connection with the cellular bottom, which is at a lower level, the pressure would close the aperture, and there being room to work in the cell, the plate might be repaired temporarily with screws, plates, &c., instead of being compelled to undergo the expensive and lengthy process by which the *Great Eastern* was repaired, in consequence of her double skin not admitting of such a method, there not being room to work in her cells. I consider such a cellular arrangement quite as conducive to strength, less costly, and less weighty than that of the double skin. I am informed that the *Hector* has some such arrangement. This method would also save much coal trimming, as the coals may be taken from either cell, as may be required, to trim the ship. The coal bunkers abreast the engines and boilers are carried up to the main or fighting deck, as shown in the diagram, thus distributing the weight and adding to the protection of engines and boilers.

By this disposition of longitudinal and vertical bulkheads, cells, and iron decks which strengthen alike the top, bottom, and sides of the ship, an amount of rigidity will be imparted that will effectually resist all strains from whatever direction they may come; the whole fabric being thus bound together, so that each part will bear its fair proportion of strain. I furthermore am led to believe that with such an arrangement much of the material now introduced in the form of massive ribs may be dispensed with in our war ships, and thus reduce the weight of the structure. I, therefore, advocate dispensing with nearly one-half of these ribs, providing for any additional strength that may be required for carrying armour plates, by resting them on longitudinal stringers four inches thick, with T flanges, as shown in the diagram; these will give the required strength and contribute especially to the firmness of the fore-body in resisting or giving the blow in the ram manœuvre; the armour plates require no bolts or other security than that afforded by these deep T flanges, either oakum or some soft material being caulked in between the flanges and the plates, will keep them sufficiently firm, and perhaps relieve the jar produced by the impact of shot. The form of vessel shown is very favourable to laying on the armour plates, nearly two-thirds of which may be applied without bending, the curves of the bow being of such a character as to materially reduce it even in that quarter. This description of form is being adopted in France, and would seem to be worthy of attention in the present state of the plate-bending question. The method shown of building in the lower parts of the mast to the decks and athwartship bulkheads, will also contribute to the general strength and rigidity of that part of the ship which is acted on by the rigging.

It appears to me somewhat remarkable that the application of iron decks did not take place earlier, as it forms one of the most important features in the construction of an iron ship, which, considered as a beam or girder, would be minus its upper web without an iron deck. Last year it was advanced as a novelty, and much credit was given at the Institute of Naval Architects to a gentleman who then proposed it. It would be scant justice to Mr. Roberts were I to omit stating, on this occasion, that this application was included in his patent of 1852, in connection with the arrangements of material I have endeavoured to explain, and many other clever adaptations and inventions that are now being applied, such as self-acting water-tight doors for bulkheads, plans for ventilation and lighting between decks, &c., which, like all other inventions that are seen to be valuable, have found many godfathers.

In conclusion, I would submit that, take this twin screw system of construction from whatever point of view we may, whether as a power of propelling, steering, or manœuvring our war ships with broadside guns, when engaged at sea, or with forts in narrow waters, or whether as applied to ships of commerce, where light draught and handiness are equally essential, the question assumes a magnitude and importance that demands the gravest consideration and the most ample experiment. My only regret is that the subject should not have found an abler advocate, and in thanking you for the patience with which you have so kindly listened to my remarks, I have but to express a hope that my endeavours may succeed in drawing more serious attention to it, as I feel, in common with many of my brother officers, that the time may not be far distant when our long heeled single screw ships may be called upon to act in narrow waters, and if so, will be taken at great disadvantage by vessels of very inferior force having the appliances I have described.

DISCUSSION.

Captain SELWYN, R.N., rose to state a few facts in confirmation of what Capt. Symonds had advanced. Facts were more valuable than any amount of mere theory, and he had for many years past taken great interest in the proper application of the screw, because, although Captain Carpenter who had long advocated the twin screw system of propulsion, failed in carrying it out satisfactorily—not from a want of talent on his part, but because the naval world was not sufficiently advanced to appreciate the value of this invention—he believed they should yet have reason to thank him, and such men as Mr. Roberts, who early saw to what extent this system might be developed. Capt. Symonds had shown himself worthy to tread in the path chalked out for him by his distinguished uncle, Sir William Symonds, whose labours, however they might be appreciated by those who built ships, were perhaps more appreciated by those who sailed in them; for to him was due the credit of the start, which was so difficult to make from old preconceived ideas in naval construction. Though not very advanced in years, he (Capt. Selwyn) was old enough to remember the changes which that officer introduced, and which every seaman remarked in the adaptation of every part of the ship, the beauty of design, and the excellence of finish; in short, he might say wherever one of his ships went she was an object of interest to every naval architect. They had done a great deal more since, and they were now likely to be called upon to go still further a-head, with a rapidity which became the present railway era. They wanted, in the first place, the means of putting into a small compass, and at a moderate expense, a power which could be fitly applied under all the varying circumstances in which naval actions were fought. He need not point out that in this question was involved the whole subject of naval gunnery, for ordinary guns were of little value against a gun which required no charging. A vessel under Captain Symonds' system of propulsion was capable of being turned with wonderful rapidity, and would form a most effective ram. These ships could turn on their own

centres, whereas, with the ordinary screw, this could not be effected in less than five or six times the length of the vessel, while the speed attained on this principle was not less than 14 knots an hour. These were questions of great importance. There were so many present who were acquainted with naval matters that they would easily understand what would be the effect of a smaller vessel, driven at high velocity, running into a larger one. Now, to come to the facts of which he spoke at the outset of his remarks, he might mention that he was on board the *Flora* and the *Kate* during their trials; and on both occasions full liberty was given by the builder of those vessels (Mr. Dudgeon), to test their capabilities in every point, which to those on board appeared to be of importance, and he could state that the results were most satisfactory to everyone present. The comparison of those vessels with others on the ordinary system left no doubt as to their great superiority in many important points. In the first place, at starting, the facility with which they could be turned was exemplified by the fact of another steamer which was leaving the wharf at the same time occupying nearly the whole breadth of the river in turning, whilst the *Flora* was turned round short, close to the wharf. If that were the fact, the case of the *Indianola*, referred to in the paper, was but one illustration of the destructive effects which small vessels, possessing these capabilities, could produce upon much larger vessels worked upon the ordinary system, or even worked upon this system. A large ship, costing a million of money, might be successfully attacked by two or more small vessels, costing only forty or fifty thousand pounds apiece; and even if she had the two screws, her length would prevent her from competing with the smaller ships in rapidity of turning. The effects of such an attack were illustrated in the case referred to by Capt. Symonds in his paper, which showed the powers of those smaller vessels in attack, in consequence of the rapidity with which the blows could be inflicted upon the enemy. In addition to this, there was another question to be considered, which was adverted to on another occasion by the gallant admiral in the chair. Looking at the vast extent of commerce to be protected by this country, our ships were required to be ubiquitous; it was, therefore, not so much a point of size of ships, as of number of ships. The commerce of this country extended to every quarter of the globe, and was found in every sea; and, looking to the exploits of the *Alabama*, they saw what we might have to do, in the event of a war, with regard to the protection of our wide-spread commerce. But we could not do this with a limited number of large ships; what was wanted for such a purpose was small, efficient ships, which might be everywhere, and almost in two places at the same time if necessary. Naval officers would be content to forego the glory of working large ships, and trust to the people of this country for laudation, if they could only accomplish their object. The system advocated by Captain Symonds, for lifting the screws, was, he thought, as compendious as such a system could be. The application of steam in marine propulsion was, doubtless, capable of immense improvement. It was desirable to economise heat more than was done at present in our steam vessels, and when he saw a flame six feet high rising from the funnel, it occasioned him some regret for the loss of a large per-centage of fuel. To this point attention ought to be called, inasmuch as there was a limit to the capacity of vessels for carrying coals. The question before them was, how, in these ships, the conditions of obtaining the greatest amount of power with the smallest amount of fuel could be fulfilled. The mechanical question was one he would not enter into in the presence of such an authority as Mr. Roberts advising Captain Symonds, but he could not withhold the expression of his entire concurrence in the mechanical arrangements adopted in the present instance to secure strength.

Capt. A. Henderson expressed his approval of Mr. Roberts's design of a vessel, which he carefully examined seven or eight years ago. It combined the advantages of the double screw with a vessel of large beam and moderate draught of water. His experience had taught him that vessels of large draught were unfit for blockading purposes. Capt. Henderson referred to a form of vessel, designed by him twenty-two years ago, for navigating the tortuous and rapid rivers of India, in which, in order to prevent running ashore, he fitted a rudder in the bow as well as the stern. One of those vessels, the *Assam*, could be turned half round in fifteen seconds. In 1859 he built a vessel of 1,000 tons for the East India Company. The length was 225 feet, and it was fitted with one screw, with bow and stern rudders. She could turn in less than three minutes with one rudder, and in less than two minutes with both. It was important for gunnery purposes that they should be able to point the gun by the ship. If they combined the double screw and the single rudder they would gain many advantages. The vessel would turn in a smaller space, and he believed she would steer with less resistance. The common rudder, when put hard over, occasioned great resistance, to obviate which he proposed to use a balanced rudder, a combination of which, with the double screws, would be the best for large ships.

Mr. Newton Wilson would take the opportunity of mentioning a few facts, which he believed were not generally known, with regard to the advantages of the system brought before them this evening. The plan of the double screws had been adopted in America with great success. In 1845, a vessel upon this plan was built at Boston from the designs, and under the superintendence of, the American engineer, Ericsson. It was built at the cost of the insurance companies in Boston, and launched in August, 1845. This vessel was used for many years in and about the harbour of Boston for the purpose of rescuing ships which had got into dangerous positions. It was found that by means of the twin screws the most intricate passages of Boston harbour could be successfully navigated by this little vessel. It could turn in its own length in a remarkably short space of time, and it had been computed that many millions of dollars had been saved to the insurance companies of America by means of that vessel. She was sent out whenever there was a gale of wind, and brought in vessels which were in a dangerous position. On one occasion she succeeded in rescuing one of the Cunard steamers from a position of difficulty, and brought her safely into Boston harbour. This vessel was continued in that service up to the commencement of the American war, when she was bought by the Federal Government, and fitted as a gun-boat. She was present at the battle of Roanoke Island, and continued in the capacity of a gun-boat, doing good service, up to the last winter, when she was wrecked on one of the bars in the neighbourhood of that island. It was, therefore, evident that this plan of twin screws was an excellent one, and he thought they were greatly indebted to Captain Symonds for having brought this interesting subject before them.

Mr. Zerah Colburn inquired if that vessel was fitted with double engines?

Mr. Wilson replied she had distinct engines, shafts, and screws. She continued in active work for seventeen and a-half years.

Captain Selwyn wished to add the remark that the great defect in the screw hitherto used was the difficulty of steering a-head against a gale of wind, from the defective area of push as compared with that given by paddles. In the present plan that defect was to a great extent remedied.

Mr. Martin said, hearing the name of Capt. Carpenter mentioned in connection with this subject, he would state that he assisted in fitting that gentleman's vessel with double screws, and was present at the trials made with her in the Thames. On that occasion it occurred to him, as it did at the present moment, that in working the double screws, the amount of friction was greatly increased—he believed it was doubled. Both screws were worked with one engine, which was ill-adapted for the

purpose, and ultimately the vessel was laid by altogether. He should state that the screws were arranged differently from those of Captain Symonds. He believed that with the ordinary screw, the Government allowed three-tenths for friction, and with the double engines they would have nearly twice that amount of friction. If they could work the two screws with a single engine it would reduce the friction. He did not say it would not be better to have an engine disconnected for each shaft, but as vessels for the most part could not carry more than 14 days' fuel, he thought the double screws would not answer, as the two engines would consume a vast amount more fuel than a single one. He was present at some of the trials of the screw with the *Rattler*, and the blades of the screw were reduced from time to time, and ultimately what remained was accidentally lost. In all the experiments with that screw, it was proved that one-sixth of a turn gave the most effective result. He had gone as much into screws as most people, and he was led to believe that the form of screw propeller introduced by Capt. Symonds would not answer. The single blade screw, of one sixth of a turn, was most effective. He was not prepared to say that Griffiths' screw was not more effective than the ordinary screw, as shown by the trials made in Stokes Bay. If it could be shown that double screws could be worked with only moderate friction, he should be very glad to hear it, and to be informed how it was done.

Mr. RICHARD ROBERTS inquired whether Mr. Martin referred to the friction of the screw in the water, or to the friction of the engine alone, or to both?

Mr. MARTIN replied that his remarks had reference to the machinery and the bearings.

Mr. ROBERTS observed that if the engines were well made the friction would be small, not more than one per cent. of the whole power. The friction of the fans in the water would be small, and they would not revolve at higher speed than the ordinary screw.

Mr. MARTIN added that he had tested the government engines, and had made the instruments used for the purpose, and he found the average friction to be three-tenths.

Mr. ROBERTS said there was no accounting for the allowances people had to make for their bad work. The friction of the shafting, if well made, would be very small indeed; and in mills it was scarcely worth taking into account. In one case he had 1,600 feet of shafting, and he considered it took next to nothing from the effective power of the engine.

Mr. MARTIN said he had two large steel discs made, 14 inches in diameter, which were put in for the end of the screw-shaft to work against, and the friction was so great that they almost amalgamated with the shaft. He should like to know whether such a pressure as that at the end of the shaft would not seriously detract from the power.

Mr. ROBERTS replied, as to the pressure melting the metals, that was from a want of knowledge on the part of the constructor; he had not given sufficient area of surface. If he had given surface enough, there would have been little friction and little tendency to heat

Mr. CARNEGIE said it would be interesting to be informed of the dimensions of the *Flora* and *Kate*, by which they could judge more correctly of the performances of those vessels; also the respective horse-power of their engines.

Mr. LEWIS OLRICK remarked that the fact had been overlooked that at the present time they were using enormously heavy engines, in which there was great friction, although he could not agree that it reduced the effective power of the engines to the extent of three-tenths. Mr. Martin appeared to overlook the fact that the engines used for the double screws would be of a different construction, and there would be no difficulty in reducing the consumption of fuel. The great secret with regard to that was, in having a fine pitch of the screw, and with a fine pitch the engine would work at high speed, with a moderate consumption of fuel. The engines proposed for the double screws would scarcely be larger than the locomotives in use on the Great Western Railway, so that there would be a great reduction of weight, as well as of friction, and with these small direct-action engines the consumption of fuel would be much less than with the ponderous massive engines now in use. Less fuel was consumed in the locomotive in proportion to the immense power produced. With regard to the remarks of Mr. Martin as to the fact of the screw propeller used in the *Rattler* having been denuded of its blades, he (Mr. Olrick) had seen that propeller in the Patent Museum, at Kensington. Reverting to the subject of friction, he did not believe that any engine from the manufactory of Maudslay or Penn had a friction of $\frac{3}{10}$ths. It was the rule to calculate that amount of friction ten years ago, but since that time it had been reduced fully one-half. Small engines, like those which would be used for the double screws, could be made more perfect in their parts and with less friction than could be done with the larger and heavier description of engines. He begged to say, in conclusion, that the results of experiments made by him were greatly in favour of the non-fouling properties of Captain Symonds' screw.

Mr. DUDGEON believed he could state facts to show that the double screws could be worked with as little expenditure of fuel as the single screw. The *Flora* had been at work several months, at an indicated horse-power of 500, with an average comsumption of 11 tons of coal in 24 hours. He did not believe there was a vessel with a double or single screw which could show a better result than that, unless using the expansion principle. The nominal horse-power of the engines was 120. He might be permitted to add that he did not believe there was a vessel afloat with the same midship section as the *Flora*, being in round numbers about 200 feet, which had a higher speed. She carried a cargo of 300 tons upon 9 ft. draught of water, at 13 knots an hour. With respect to the dimensions of these vessels, as near as his memory served him, the length was 165 feet; beam, 22 ft. 6 in.; and depth, 13 ft. 6 in. He was happy to have it in his power to corroborate all that had been said with regard to the steering powers of those two vessels. Although only provided with the ordinary rudder, their steering was perfect. The American experiments alluded to by Captain Symonds showed that 1 minute 55 seconds was occupied in turning half round the circle, whereas, in his own case the whole circle was turned in three minutes. He was happy to be able to inform the gentleman who had spoken on the subject of friction, that he did not find any extra loss of power through the friction of the double shafting, or from the double propellers passing through the water. It had been truly stated by Mr. Roberts, that two small propellers could be made to evolve as much power as one large one, with only the same amount of friction. He had the pleasure of informing them, that on Saturday he should try another of these double-screw steamers, and he had no doubt the propelling power would be as good as that of the vessels which had preceded her. To show how much the system was becoming appreciated by the public, he could state that at the present time he had as many as eight vessels, of from 800 to 1,000 tons burden, on order, and laid down in his yards. The vessel he had just completed was named *Hebe*, and was of the same dimensions as the *Flora*.

Mr. PURDIE wished to inquire what arrangements Captain Symonds had made in case of derangement of the rudder? In ordinary cases rudders, when deranged, could be worked by tackle.

Captain SYMONDS, in reply to the observations made, said, with respect to Mr. Martin's objection as to the increased amount of friction of the two screws, the meeting would agree with him that it was quite unnecessary for him to add one word to the remarks of Mr. Roberts on that point, to which might be added the fact stated by Mr. Dudgeon, that during all the time the *Flora* had been working she had shown better results in

proportion to her size than any other vessel having the same area of midship section. With regard to the question just put to him as to how he would steer in the event of the derangement of one of his rudders, he would say there would be sufficient steering power left in the other rudder, and if both rudders were disabled he could steer with the screws.

Mr. Purdie—Suppose you have no steam?

Captain Symonds replied in such a case he should be precisely in the same condition as other ships when they had lost everything, and he could only do as they were obliged to do under such circumstances.

Mr. Purdie remarked that they had tackle to attach to the rudder above the water line.

Captain Symonds said that at present he had made no provision for attaching tackle to his rudders, but, having two rudders, and the area of either being sufficient to steer with under ordinary circumstances, he contended he had a better chance than a ship with only one rudder. He was in hopes that some gentleman would have favoured him with some criticism upon his plan of lifting the screws, but he did not, on that account, regard it as perfect. He had to thank them for the kind manner in which his paper had been received, and he would repeat that he trusted it might induce those to pay attention to the subject who were more able to do so than himself, because, as a seaman, he was satisfied, and many of his professional brethren were also satisfied, of the invaluable character of this application of two screws to ships of war certainly, and, as far as his experience would enable him to judge, they would be of great advantage to sea-going merchant ships.

The Chairman said he was sure all present had listened to this paper with the greatest interest, and in his opinion, there was no subject exceeding in importance that which had been brought under notice this evening. He believed most present were aware of the course the Admiralty had adopted on the subject. No one could doubt they had had great difficulties to contend with, inasmuch as an entirely new mode of construction was forced upon them by circumstances; but he should belie his own conscientious convictions if he did not say, the results arrived at were most unsatisfactory. They had a vast number of different types of vessels; but he believed the large ships they were now building were great evils in this respect; that as far as they knew they had a probability of meeting antagonists of 4,000 or 5,000 tons, whereas they were building ships of 9,000 or 10,000 tons. He thought ships of that size would have no functions to perform. Ships of a smaller size would not go to fight them, and on the other hand no glory was to be achieved by the victory of a ship of 10,000 tons over one of 4,000 or 5,000 tons. At the same time, when they built ships of such vast size and at so great an expense, the number of them must be diminished. They had interests to watch over and protect in every quarter of the globe, and he thought it was absolutely necessary that they should have ships equal in size, and superior in speed to all others, and that they should be numerically superior in proportion to the vast number of possessions they had to defend, which were more widely spread than those of any other nation. He thought that was of importance; and when they considered that these large ships could only turn with difficulty in large areas, there was no question that the great defect was in the steering; and if the remedy for this were the only advantage proposed by Captain Symonds, it was one that they ought gladly to accept. He had no doubt, under existing circumstances, two or three ships of smaller size would be fatal antagonists to such vessels as the *Northumberland* and *Minotaur*, with only one rudder, and without proper means of turning. The subject therefore was one worthy the attention of every Englishman, and what they had heard from Capt. Symonds this evening pointed, in his opinion, towards the direction in which they must look for a remedy. He had no doubt the plan now before them would be adopted before long, and he thought the sooner the better. Capt. Symonds had given his reasons in support of his plan, and no objection had been raised against it which possessed any weight. With respect to steering, the advantages were obvious, because a ship with a single screw, if she lost her rudder, would not only not steer, but her screw would turn her round and there would be no counteracting influence whatever In the plan of Capt. Symonds, if she lost one rudder, she would have another left to steer by, and if she lost both rudders, she could be steered by means of her screws. The subject was altogether one of great interest, and he was sure they would all cordially support him in returning thanks to Capt. Symonds for his most valuable paper.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 29th inst., a paper by Prof. D. T. Ansted, M.A., F.R.S., "On the Varieties of Combustible Minerals used, economically considered in reference to their Geological Position and Relative Value for certain purposes," would be read.

COTTON GIN FACTORY IN THE DHARWAR COLLECTORATE.

Amongst the selections from the records of the Bombay Government which have recently appeared, is an interesting report, by Surgeon-Major Forbes, the superintendent, on the Cotton Gin Factory in the Dharwar Collectorate, for the half year ending the 31st May, 1862, with letters from the Revenue Commissioner, Southern Division. The subjects discussed in Dr. Forbes' report relate to the various experiments made under the direct agency of the officers appointed by Government, since 1829 to the present time, for the introduction into the Belgaum and Dharwar districts of American and other exotic cottons, and an improved machinery for cleaning cotton. But the most important matters noticed in this report relate to the causes of the present enormous demand for machinery; the probable supply of American cotton available from Dharwar and contiguous districts; the necessity for European agents in the districts; and the adulteration of the cotton by native dealers and the remedy. These points are noticed in the report, from which the following are extracts:—

One result of the present enormously enhanced value of cotton has been the sudden and surprisingly increased demand for cleaning machinery—the number of applicants on the register who have deposited the usual advances amounting to 591, the value of which will be 1,38,000 rupees.

The cause of this is that the money is now reaching the pockets of the ryots, and that they can afford to purchase gins for themselves, instead of depending, as heretofore, upon the dealers, to whom a large portion of them were obliged to sell their cotton uncleaned, the bargain generally depending upon the proportion of wool to seed—a point which rested upon the dealer's word, and which the ryot well knew was rarely decided otherwise than to his disadvantage.

It is very desirable that this demand for machinery should be met to the fullest extent for several very important reasons. In the first place, an adequate supply will ensure the cleaning of each season's crop in sufficient time for export before the monsoon sets in, and with the prospect of good communication and direct shipment from Sudashewghur, the produce of these districts may be expected to reach England within six or seven months from the time of its being picked from the field, instead of occupying eighteen months or two years in transit, as has hitherto been the case, much to its detriment in value, owing to deterioration of strength and colour of the fibre.

A second advantage of a full supply of machinery will be the extension of the cultivation of American cotton, it may be hoped ultimately to the entire expulsion of the native variety for export from the Dharwar district,—an object, in my opinion, much to be desired, as the latter is not only a far less profitable crop to the ryot, but with the exception of one or two localities, it is of very ordinary quality, and is chiefly made use of for admixture with and adulteration of the American variety.

A third advantage which would accrue from the ryot being in possession of ample means of cleaning his own crop would be that less of it would pass for that purpose into the hands of the sowcars and dealers, and the admixture and adulteration which is now so prevalent would to a certain extent be remedied.

The above-mentioned adulteration and admixture of inferior native cotton with the American variety during the process of cleaning is carried on openly and undisguisedly at all the cleaning establishments of the sowcars and dealers throughout these districts. Though aware of the practice, I had no idea of the extent to which it was pushed, until I paid these places a visit last season when they were at work.

A description of one of them (a large native cleaning establishment at Guddug) will serve as a general sample of the whole. On entering the courtyard, which was enclosed by a high wall on one side, was seen a large heap of very inferior and trashy-looking native kupas and near to it a pile of about the same bulk of very fair American seed cotton. The space in front of the gin-room was covered with a mixture of these two heaps, spread out in the sun to dry, and upon this mixture the gins were at work.

Samples both of the seed and the cotton taken from the gins whilst at work (here and elsewhere) were forwarded by Mr. Haywood to the Cotton Supply Association with full details.

The injury which this nefarious practice inflicts upon the character of this produce in the home market, and consequently upon the interests of this part of the country, does not require comment.

The real value of pure Dharwar-grown American cotton in the English market is no longer a matter of doubt. It has been established beyond dispute that it is quite equal to the supplies from America of what is called "Middling Orleans," which is the description of cotton most in demand, In proof of this, if such were required, quotations could be furnished from the opinions pronounced by the home authorities (both spinners and brokers) upon the supplies sent to them on various occasions for the express purpose of ascertaining this point.

Within the last five years the cultivation* of American cotton in the Dharwar districts has increased more than six-fold. There is no reason to doubt that this increase will continue. The demand for machinery (if it is fully met) is a guarantee that it will do so, in which case a short time hence the whole available area of the Dharwar cotton land will be covered exclusively with this valuable plant, and the extent under yearly cultivation, including native jagheers, will not be less than 380,000 acres, leaving about 80,000 acres of the present area of cotton cultivation for the growth of native cotton for home consumption. Bellary, Belgaum, and Raichore are immediately contiguous (where the cultivation of American cotton has already extended), and may be safely estimated at 220,000 acres more (this being not more than one-third of the area in those districts at present under native cotton). The above total area of 600,000 acres will, at 4 acres to the bale, furnish 150,000 bales of New Orleans cotton. From Mysore, which is also contiguous to Dharwar, a considerable addition ought to be obtainable before long.

Though this quantity would be but a small mite in the enormous home consumption, still it is the identical article wanted in England. Unlike other descriptions of Indian cotton it requires no alteration or adaptation of the spinning mills for its use, and in no other region (out of America) that I am aware of have the attempts at its cultivation met with the success even already attained in Dharwar and its contiguous districts.

With the experiences now being realised at home, the question of providing the further measures required for the protection and encouragement of even this extent of cultivation is one well worth the consideration of those most deeply concerned. Government can do little more in the matter; the field is now ready for private enterprise. The intervention of European agency between the grower and the consumer, to take the place of the present native dealers, is what is required; and by the opening of next season, facilities will be afforded for the introduction of these agencies such as have not hitherto existed.

Good communications to the sea-board, with the means of direct shipment thence, will remove the necessity that existed for all the changing of hands that has hitherto been found necessary between this and Bombay.

It must, however, be admitted that so long as the sowcars and native dealers are unrestricted in the nefarious practice of adulteration, which I have above exposed, the European must enter the field at a great disadvantage, in so far as that they would be able to outbid and undersell him to the extent of the difference of price between the rubbish they use for admixture and good New Orleans cotton.

Those parties would also doubtless make a strenuous effort to preserve their present monopoly, and whilst the competition lasted, they would be in a condition, without incurring loss themselves (merely by foregoing their profits), to raise the price of the American cotton to a rate with which the European could not compete.

The prevention or suppression of this fraud becomes therefore one of the most essential measures for the welfare of the cotton interests of these parts. Clause 2 of a Bill read before the Legislative Council of India on the 16th January, 1858, for the better suppression of frauds in the cotton trade of the Bombay presidency, makes the fraudulent mixing of good and bad cotton in the same bale a penal offence. This appears to me to apply exactly to the case under notice, which can bear no other interpretation than a wilful admixture of an inferior with a superior article with fraudulent intent.

In bringing this matter so prominently to the notice of Government, I beg to point out that it is a purely local evil, which does not exist elsewhere, as there is no cultivation of exotic cotton in any other part of India to lead to it; it therefore becomes a question for consideration of the local legislature.

The parties by whom this fraud is perpetrated are quite aware of the illegality of their proceedings, and have nothing to say in defence, except that they do not think it can be of much importance as no notice is taken of it.

The cultivator is in no way concerned, and any measures taken for its suppression would be a matter of indifference to him. If therefore the local government is pleased to view the evil in the light in which I have represented it, and to bring forward a legislative enactment declaring such admixture of these two varieties of cotton to be illegal in terms of Clause 2 of the said bill of the Legislative Council, I believe that a proclamation to that effect, distributed amongst the dealers, would of itself suffice in a great measure to put a stop to the practice.

At all events, it would rarely, if ever, be necessary to resort to any of the severe penalties of fine, imprisonment, &c., provided for by the above-mentioned bill. A temporary suspension of the cleaning operations of the establishment would be a more suitable punishment, and would, I believe, prove quite sufficient.

The difference between the seeds of the American and

* Last year 1861-62, American cotton, 214,310 acres; Native cotton, 243,000 acres; total, 457,310.

native cotton is so marked that there is no difficulty whatever in discovering their admixture in the saw-gins; the detection of this offence would, therefore, with very little trouble, become almost unavoidable.

Before concluding, it may not be out of place to notice the prospects of the native cotton of this country in connection with the new cleaning-machinery, upon the rolling or churka principle, which has just been constructed for its use, and which, I trust, will serve to obtain higher favour for this produce than it has hitherto met with in the home market.

During the last twenty-five years the government of India has fully appreciated the necessity of obtaining some more expeditious method of cleaning indigenous cotton than by the slow and expensive process of the native churka, and at various successive periods every temptation and inducement that could be offered was held out to obtain the desired end.

The Supreme Government at Calcutta challenged invention by offering prizes in money of large amount sufficient to induce the best mechanical skill of the country to enter the lists, and at the appointed trials many and varied inventions and modifications were brought forward; but the result proved that the task had baffled the skill of the competitors, and that the "time-honoured" churka continued to hold its sway in triumph.

One or two points essential to success had been overlooked in all these machines, and though some of them in short trials appeared to give promise of success and obtained prizes, still, when brought into practical use, it was found that they could not surpass the "churka" even in the single requirement of quantity of out-turn of work, and ultimately all hopes of obtaining such a machine seemed to have been abandoned.

For some years back I have paid very considerable attention to this subject, and after careful practical study succeeded in producing a machine entirely free from the above defects; and on proceeding to England I took with me working models of these machines and also supplies of seed cotton. I was thus enabled personally to lay these models before some of the first machinists of the country, and to explain where the former difficulties lay, and the exact nature of the article now required.

Various parties have been engaged, each introducing his own modification with regard to the application of power, &c., but the practical result is the production of machinery which, with the estimated labour of one man, gives an out-turn of upwards of 100 pounds of cotton-wool per day, with the additional advantage of allowing no seed to pass through.

At the very highest estimate the quantity of cotton cleaned by the best worked native churka does not exceed 20 pounds per man per day of 12 hours. With such a great advantage in economy, not to mention expedition also, as well as the yearly increasing scarcity and cost of labour, owing to the amount taken up by railways and other public works, the benefit of such machinery, when it becomes generally known, will be appreciated, and the cleaning of native cotton by its use will in all probability become a separate occupation in itself.

That it will prove sufficiently profitable to engage the attention of enterprising parties may be inferred from a statement made by Mr. Landon, of Broach, who ought to be well informed, as he had practical experience to guide him. In a letter to the Secretary to Government, dated Broach, 12th January, 1858, Mr. Landon writes:—"As an instance of the superior economy of the saw-gin as compared with the Gujarat churka (which is the most effective native machine in India), I may mention that if the whole of the native cotton shipped from Broach were to be cleaned by the former instead of the latter, a saving would be effected under this head alone of more than Rs. 30,000 (three lakhs) per annum.

The saw-gin destroyed native cotton, and its value was lowered in the market; nevertheless, labour was scarce, and the Broach saw-gins driven by steam found ample employment. I was at that place in the cleaning season of 1859, and I saw the carts laden with seed-cotton crowding to the gins, and their owners striving for precedence. The exports from Broach at the time at which the above estimate of profits was taken, amounted, I believe, to about 45,000 bales per annum.

That portion of the province of Berar which is now being penetrated by the railway, yields three times the above amount of cotton, and manual labour is still more scanty. The produce, as it is picked from the field, is piled up in one large heap in the open air, where it remains sometimes for months until labour can be obtained.

When first stored in this way, from a short distance it resembles a heap of snow in whiteness. Duststorms, however, set in, and the heap becomes gradually covered with fine sand and earth, until at length one can no longer distinguish what the contents may be. A few showers of rain generally succeed those duststorms, and the amalgamation of mud and cotton is completed.

I may here observe that although the cultivation of native cotton is capable of extension to an enormous degree, yet the amount of labour available is barely sufficient to clean the quantity now produced. Any large extension without the aid of cleaning machinery, therefore, cannot be expected, and this remark is the more applicable, when it is considered that the chief increase in cotton cultivation must be looked for in new districts, such as those of Central India, where population is thin and scarcely sufficient to till the land. In a well-populated district, like Dharwar, after cultivation and picking have been disposed of, the available manual labour is wholly insufficient to clean the produce by the ordinary method, and though cotton has always been a paying crop, it was not until cleaning machinery was introduced that cultivation largely increased.

Under the disadvantages I have named, and others that might be added, with which Indian cotton has to contend, it may be truly stated that, with respect to quality alone, the consumers at home are as yet ignorant of the extent to which India is capable of meeting their wants. Its produce has not been appreciated, because it has rarely reached them in fair condition or unadulterated.

Before the present scarcity, when American cotton was procurable, Indian cotton was scarcely looked at, save for re-exportation, and this latter crisis will only tend to complete the ruin of its name and character, for it is notorious that the high prices ruling have led to admixture and adulteration which have quite eclipsed all former experience.

Anything resembling cotton which could be packed into a bale readily passed muster. I have been told, upon reliable authority, that the "sweepings" of the gin-house (formerly cast away) have been sold in Bombay at 130 rupees per candy. It is probable, therefore, that at no former period has the cotton produce of India been sent to England in a condition so unfavourable to its real character.

A very different tale might be told if the crop, from the field to the final pressing, received the same care that is bestowed upon it in America; but this need never be hoped for so long as the whole trade of the interior is left to native dealers.

When recently at home I was told by spinners, who had been in the habit of using native Indian cotton, that there was cotton in India which would suit their purpose perfectly, but that they could not depend upon uniformity of quality even in the contents of a single bale. This fact is the secret of the bad repute of Indian cotton, and it points at once to the only remedy (one which has been often enough urged by all men who had practical experience to guide them), viz., the establishment in the interior by private enterprise of European agency, capable of competing with the native dealers, in whose hands this entire trade is at present suffered to remain.

There are two objects to be attained which have hitherto

been totally neglected—First, securing to the ryot the certainty that any improvement he can effect in the quality of his produce by the exercise of a little more care and trouble in cultivation and picking will bring him its reward; secondly, to provide the means of protecting the produce from adulteration until it has been finally pressed for export.

That these should be the work of private enterprise no one will dispute, and until it be attended to all the aid that is so loudly called for from Government may be granted tenfold. The country may be interlaced with roads, railways, and canals, but the prospects of its cotton trade, in so far as the requirements for home consumption are concerned, will be in no way improved.

I have reason to know that the correctness of these remarks is no longer doubted by parties at home who have given the subject fair and unprejudiced consideration, and who are not unwilling to provide the means for establishing the agencies required; but they are deterred from commencing operations under the impression that India is not yet prepared for such an enterprise.

It is right, however, to state that such is not now the case; the impediments which formerly existed are rapidly being cleared away, and even within the last twelve months facilities have been opened out which afford ample room for immediate action.

The province of Broach (one of the finest cotton districts in this presidency) has rail and water communication with the shipping in Bombay harbour. Sholapoor is opened out, and has its railway carrying cotton to the same port. So likewise with Berar, where in a short time the only interruption will be about eleven miles on the Thull Ghaut, which, with the railway arrangements, will give very little trouble; and the Southern Maratha country and Dharwar districts have new facilities such as they never enjoyed before; these alone are more than sufficient to encourage an immediate commencement.

I have stated above that the number of gins now applied for amounts to 591, over 200 of which have been ordered within the last month. I should now mention the means available as well as the measures which have been adopted to meet this demand. On the 11th April last I applied for the sanction of Government to enable me to procure from England a supply of iron-castings for 300 gins, and I received a reply granting the required sanction, from which I have been able to send the necessary orders home by the mail which left Bombay on the 27th May last. I have also forwarded, on the 29th May, a second application for permission to obtain a further supply of 300. These, when received, will suffice for the parties who have already applied.

To meet the further demand which may be anticipated, there is supply of material now arrived in Bombay (independent of that which has been lost by the wreck of the *James Pilkington*), which, when received, with the aid of other resources, will enable the factory to have upwards of 100 gins ready for distribution in time for next year's crop.

I may here mention, that though the Home Government advances the money required for the necessary materials, the State is in no way a loser by these transactions. The articles obtained from England embrace only such portions of the machine as are best made in cast-iron; the remainder, along with the furnishing and fitting up, is completed at the factory, where the charges for work done are so framed as to cover every possible expenditure, including superintendence.

On referring to the returns, I find that during the six years ending 6th June last, the receipts realised have fallen short of the expenditure by a sum of 1,280 rupees, making 213 rupees per annum, or 17¾ rupees per month, the sum which for that period has been the sole cost to Govern- of the Dharwar cotton establishments, and even this deficiency is due to partial suspension of gin-making, pending the receipt of iron materials from home. The sale of the extensive supplies now in the country or ordered, will more than cover this deficiency.

Before closing this report, which mainly relates to the extension of New Orleans cotton, it may be as well to give an approximate estimate of the quantity of native cotton which may be reasonably looked for from the cotton fields of the Southern Maratha country and adjacent districts, for which Sudashewghur forms the natural outlet. In this I include all the cotton land situated within about 200 miles of that port.

We have pretty accurate data of the area under cotton in our own territories and Bellary, and can at any rate form an estimate of the area within the above distance in the adjacent territory of Raichore and Mysore. After making a deduction from the present extent under cotton for the supply of the quantity of American cotton mentioned above, there will remain in Dharwar, Belgaum, Bellary, and the southern districts of Sholapore on the Krishna, 630,000 acres for native cotton. I am certainly rather under than over the mark in putting the present cotton cultivation of Raichore and Mysore at 350,000 acres more, making a total of 980,000 acres, which, at the moderate estimate of seven acres to the bale, will give 140,000 bales of native cotton, which, with the amount of New Orleans cotton, estimated above, gives a total of close upon 300,000 bales as the cotton available for export from Sudashewghur. The facilities afforded for export, and an increased supply of cleaning-machinery, will, doubtless, add very considerably to this amount.

ROYAL NATIONAL LIFE BOAT INSTITUTION.

From the annual report of this institution, just published, it appears that during the past year the society had placed fourteen new life-boats on the coast, viz:—at Blakeney, Kirkcudbright, Kingstown, Poolbeg, Howth, Withernsea, Thorpe, New Brighton, Appledore, Guernsey, Porthleven, Tynemouth, Fleetwood, and Newhaven; six of this number occupying new stations, and the remainder replacing worn out or inferior boats. Other life-boats were in course of construction for Budehaven, Swansea, and other places. Transporting carriages and substantial boat-houses had been provided for all the life-boats. Six life-boats had also been built for the Portuguese government, by Messrs. Forrestt, on the Institution's plan, and one for the Colonial government of New Zealand. The Institution had now 124 life-boats on the coasts of the United Kingdom. Of the fourteen new boats placed on the coasts during the past year, no less than eight had been the special gifts of individuals, and another, that at Thorpe, in Suffolk, was presented to the society by the town of Ipswich. The life-boats of the Institution during the year 1862, had saved 358 persons from wrecked ships, nearly the whole of them under circumstances of imminent peril, when no other description of boat could have performed the service. For these services the Institution had granted rewards amounting to £915 18s. 1d. On these and quarterly exercise, the life-boats had been manned by upwards of 6,000 persons, and happily, with one single exception, without loss of life. During the past year, 4,081 lives had been saved from shipwrecks on our coast. The total number of persons saved from shipwreck, from the establishment of the Institution in 1824, to the end of the year 1862, either by its life-boats, or by special exertions for which it had granted rewards, is 12,854. During the past year 13 silver medals, 14 votes of thanks inscribed on vellum, and £1,125 8s. 1d. had been granted by the Institution for saving the lives of 574 persons by life-boats, shore-boats, and other means, on the coasts and outlying banks of the United Kingdom. Since the formation of the Institution it had expended on life-boat establishments £67,780, and had voted 82 gold and 718 silver medals for saving life' besides pecuniary awards, amounting together to £16,478. The committee expressed their deep acknowledgments to the Board of Trade, the Coast Guard, the Local Committees, the Railway and Steam Packet Companies, for

their continued valuable and zealous co-operation. The total receipts of the Institution during the year 1862, amounted to £14,825 5s. 1d.; of that sum no less than £2,715 was given by benevolent individuals to defray the cost of ten life-boats. The committee gratefully acknowledged the receipt of special contributions from foreign countries: £100 from the President of the United States of America; £50 from the Maritime Insurance Company of Finland; £251 15s. from China. The following legacies had been left to the Institution since the last report:—Miss Ann Cullo, £1,000 free of duty; T. A. Venables, Esq., of Worcester, £500; Mr. John Jolley, farmer, Oxfordshire, £210; Mr. Thomas Robinson, commercial traveller, of Cheetham, Manchester, £210; Dr. C. T. West, of Kingston-upon-Hull, £100; William Lupton, Esq., Salford, £100; Miss Alice Gedge, of Great Yarmouth, £100. The expenditure of the Institution during the same period was £14,247, of which sum £5,269 6s. were expended on additional life boats, transporting carriages, boat-houses, and necessary gear, and £3,977 0s. 4d., on the necessary expenses of repairs, painting, refitting, and inspection; £1,094 6s. 1d. in rewards for services to shipwrecked crews; and £2,242 9s. 10d. for coxswain's salaries, and the quarterly practice of the boats' crews. The committee had incurred further liabilities, amounting to £3,100 6s., for various life-boat establishments, &c. No society had a stronger claim for general sympathy and support than the National Life-boat Institution, whose life-boats, under Divine Providence, had so often preserved to an otherwise desolate home a husband, father, or brother. The committee therefore appealed with confidence to the country at large to assist to maintain a state of thorough efficacy the 124 life-boat establishments of the Institution.

Home Correspondence.

COTTON SUPPLY.

Sir,—The evening when Mr. Cheetham favoured the Society with his valuable paper "On the Present Position and Future Prospects of the Supply of Cotton," I took the liberty to offer a few remarks on the capacity of Italy to produce large quantities of cotton, basing my observations on the fact—

1. That Italy possesses a considerable quantity of land capable of producing cotton.
2. That she has for a long time produced cotton, and the growers are therefore accustomed to that cultivation.
3. That Italy has a large population, with labour remarkably cheap; and, above all,
4. That new life and energy have been introduced into all the affairs of the kingdom, whether political or economical.

I have therefore much pleasure in sending you a translation of the decree appointing a Royal Commission for Promoting the Cultivation of Cotton in Italy; and it will be gratifying to the Society to see that the president is the Commendatore Devincenzi, who was the Italian Commissioner to the International Exhibition in 1862, and who has himself shown so much ability and energy in bringing the subject before the public in this country. I am, &c.,

LEONE LEVI.

Farrars-buildings, Temple,
April, 1863.

Report of His Excellency the Minister of Agriculture, Industry, and Commerce, on the Formation of a Royal Commission to Promote the Cultivation of Cotton in Italy.

Sire,—Now that Italy has risen politically and has become a great nation, it is the more necessary that she should also rise economically, and that she should return once more and with alacrity to her old path of industry and commerce. The life of modern nations consists in the development of public wealth, and the political and economical power of a state are generally united. Whatever be the difficulties we have to contend with, certain it is that the many advantages we possess from soil and climate, and from the altered condition of trade, cannot fail to enrich the country. We trust that the same energy and perseverance which have so wonderfully led to our political regeneration, will place us soon among the most prosperous nations. And we are persuaded that the Italian nation already feels strongly the need of advancing with energy in economical progress, and of bringing public wealth to the level of our political standing. The government of your Majesty cannot but second with all the means at its disposal this great national want, and we deem it desirable to turn our attention especially to the southern states and to our great islands as parts of the kingdom, which, having hitherto been left uncared for, may contribute to a speedy and large increase of national riches.

The cotton industry is very extensive, it being a textile material used for the clothing of the greatest number of people. The power of two of the greatest nations is principally based on the cotton industry. The United States gathered in 1860 upwards of 4,500,000 bales of cotton, representing a value of 1,000 millions of lire; and England exported in the same year cotton manufacture amounting to upwards of 1,300 millions of lire, which constitutes 38 per cent. of the total exportation of that rich country.

The American war having rendered the produce both scarce and dear, a rare opportunity is affored to try if it be possible to promote among us a large cultivation of cotton. The first attempts always demand large expenses, which are at first discouraging, but the extraordinary prices now ruling may render even such attempts remunerative.

The cultivation of cotton in Italy is very ancient. Before the gigantic changes produced in the cotton industry by the introduction of new and wonderful machinery, and by the extensive cultivation in America, Southern Italy cultivated, spun, and manufactured cotton very largely. During the French Empire, the continental blockade having thrown hindrances on the cotton and woollen trade of America, considerable impulse was given to this cultivation in these regions. And although, when the blockade was removed, the extraordinary reasons which favoured it ceased to exist, still it was not abandoned altogether. In Sicily, in Ottronto, and Pau, and in the Principati Citeriore, 40,000 to 50,000 cwts. of cotton were annually obtained till very lately.

In the southern provinces and in the islands we have great abundance of land, as yet of little value, suitable to this cultivation, with a large population, whose wages are very low; and an excellent quality of cotton acclimatised from the most remote times. And it may be added that the greater part of the territory adapted to cotton cultivation will be very soon traversed by railways. Among the benefits which we have reaped from the part we have taken in the International Exhibition of 1862, certain it is that the first was the opportunity offered to the Commissioners of your Majesty to bring before the public and to study in all its bearings this great economical question of the cultivation of cotton. The important conference held in London last year of the representatives of all cotton producing countries, and the grave discussions and deliberations which took place both at the Cotton Supply Association, the Chamber of Commerce of Manchester, and more recently at the Statistical Society of London, give ground to hope that Italy will be certainly among the countries able to supply the largest quantity of cotton.

The best means of promoting the cultivation in Italy is doubtless to facilitate, with good economical laws, the investment of capital in agriculture; and the Minister is now occupied on several measures which may lead to that end. But, that there may be persons who will more especially seek what may be done to promote the cultiva-

tion of cotton in Italy, and do what is necessary by all possible means, we have come to the decision to ask your Majesty to nominate a company.

It will be the duty of the Commission to publish the most useful information; to study the localities best adapted to this cultivation; to facilitate to the cultivators the purchase of seeds and machinery; and in general to promote whatever measure may best favour this great cultivation in Italy. We have the honour, therefore, to propose for your Majesty's approbation the following decree:—

VICTOR EMANUEL II.

By the Grace of God and the will of the Nation,
King of Italy.

Upon the proposition of our Minister of Agriculture, Industry, and Commerce, we have decreed and do decree:—

1. A Royal Commission is established connected with the Ministry of Agriculture, Industry, and Commerce, to promote the cultivation of Cotton in Italy.

2. The Commission will do whatever it may think best to promote, by means of the Ministry of Agriculture, Industry, and Commerce, all that may favour this cultivation in Italy.

3. The Commission will correspond especially with all the Provincial and Communal authorities; with the Chambers of Agriculture and Commerce; with the Institute of Encouragement in Naples and Palermo; with the Academy of Georgofoli of Florence; with the Royal Economical Societies; with the other Societies and Academies which promote the progress of agriculture, and with the directors of the Royal Agrarian and Botanical establishments.

4. The Commission will provide annually for an exhibition of samples of Cotton cultivated in the kingdom, when prizes may be given, reserving for ourselves to give special reward to those who contribute most to establish on large bases this cultivation in Italy.

5. By another decree the members of the Commission will be nominated. The same Minister is charged with the execution of the present decree, which will be registered in the Corte de 'Conti.

VICTOR EMANUEL.

Turin, 13th March, 1863.

VICTOR EMANUEL II.

In furtherance of the 5th Article of our decree of this day, by which a Commission is established for promoting the cultivation of Cotton in Italy.

On the proposal of the Minister of Agriculture, Industry, and Commerce, we have nominated the following members of the same:—

The Commendatore Giuseppe Devincenzi, Deputy to Parliament, *President*.
Prince Pandolfina Ferdinandi di S. Giuseppe, Senator.
Conte Augusto Pannelini, Senator.
Marquis Alberto Lamarmora, Senator.
Giovanni Battista Colacchioni.
Professor Giovanni Barracco.
Professor Chevalier Pietro Cuppari.
Chev. Demetrio Castelli.
Chev. Carlo Berti Pichat.
Chev. Prof. Gian Giacomo Reymond, *Secretary*.

THE NEW ART OF AUTO-TYPOGRAPHY.

Sir,—The late hour at which the discussion on my paper, read on the 17th inst, closed, prevented the possibility of replying to every point raised by some of the speakers. Will you allow me to take up several points now?

Mr. John Leighton's allusion to the lace-printing exhibited by Mr. William Taylor, of Nottingham, in the Great Exhibition of 1851, was a little aside of the real question—even as to the progressive steps of the kind of nature-printing to which the early part of the paper was devoted, as suggestive of autotypography, viz., the transfer to a *metal plate*. Mr. Taylor transferred lace to stone, and printed from it at the lithographic press. He also embedded lace in wood. A specimen of printing from the latter can be seen in vol. vi. of the *Journal of Design* (November 1851), printed as a surface type; the lace being *white* on a dark ground. This is a very different thing to impressing lace in a metal plate, and treating it like an intaglio engraving. The former would never have suggested the art-process which formed the real subject of the paper, whilst the latter, when applied to a feather, certainly did, as stated by myself.

It seemed to be assumed by one or two of the speakers, that Peter Kyhl, of Copenhagen, had done something more than transfer natural objects. This is not correct. His process is only recorded as being one of direct nature-printing. There is nothing suggested in the MS. in the Royal Library at Copenhagen, as quoted by Mr. H. Bradbury, which leads to the inference that he did anything with drawings, or contemplated anything of the kind.

Mr. Dickes assumed that there was an analogy between nature-printing and Mr. Palmer's process of glyphography. The fact is there is no such analogy. Mr. Palmer might have made a few experiments with intaglio plates, although I have no recollection of any such attempts; but as there was nothing to be gained by such a process, his attention was mainly directed to the production of surface blocks to supersede wood engraving. Possibly the process shown by the Imperial Printing Office at Vienna, in the Great Exhibition of 1851, might have been suggested, as I think it was, by Mr. Palmer's process; this, however, was not nature-printing, but a tedious and costly process of printing a picture in colours from a series of intaglio plates.

The question of the Chairman (Mr. Westmacott) as to the practicability of using some other material than sheet gelatine for making the drawing upon, was partly answered in the paper itself (p. 376), as two methods of making a drawing on fine India paper are named; but it was shown that a tint was produced as well as the lines of the drawing. Sheet gelatine, being as smooth, on one side at least, as the plate glass it is made upon, enables the artist to execute a drawing which will engrave or impress without any tint, except what he wishes to give as part of the effects of his work. The apparent slipperiness of the surface really presents no difficulty whatever in execution, of which a trial would have convinced the speaker, as the drawing material has a chemical and mechanical affinity for the gelatine, and flows freely from the pen and brush. In fact, it can be written upon as rapidly with this material as paper can be with ordinary ink.

I am, &c.,
GEORGE WALLIS.

16, Victoria-grove, Fulham-road, West Brompton, S.W.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. 1. Capt. Bedingfield, "Visit to Ode the Capital of the Jjebu Country, Western Africa. 2. Capt. R. Burton, H.B.M. Consul at Fernando Po, "Explorations of the Elephant Mountains, &c., in Western Africa." 3. Mr. W. Winwood Reade, "Travels in Equatorial Africa (Gaboon, Corisca, &c.)" 4. Lieut. Oliver, R.A., "Notes on Madagascar.'
Actuaries, 7.
Medical, 8½.
Philosophical Club, 6. Annual Meeting.

Tues. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. 1. Discussion upon Mr. Hawkshaw's paper on "The Middle Level Drainage." 2. Mr. Harrison Hayter, "The Charing-cross Bridge."
Royal Inst., 3. Prof. Tyndall, "On Sound."

Wed. ...Society of Arts, 8. Prof. D. T. Ansted, F.R.S., "On the Varieties of Combustible Minerals used Economically, considered in reference to their Geological Position and Relative Value for Certain Purposes."
London Inst., 12 p.m. Annual Meeting.

Thurs...Royal, 8½.
Antiquaries, 8½.
Royal Soc. Club, 6.
Royal Inst., 3. Prof. Ansted, "On Geology."

FRI.......Royal Inst., 2. Annual Meeting.
" 8. Mr. John Leighton, "On Japanese Art."
Archæological Inst., 4.
R. United Service Inst., 3. Mr. Bonamy Price, "Venetia and the Quadrilateral."
SAT.......Royal Inst., 3. Professor Max Muller, "On the Science of Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 10th*, 1863.]

Dated 30th March, 1863.

816. J. Musgrave, Globe Works, Bolton—Imp. in the construction of steam boilers.
818. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in moulds to be used for casting steel or homogeneous iron.
820. J. Carver, Nottingham—Imp. in the manufacture of carriages employed in machines for the making of lace or other fabric.

Dated 31st March, 1863.

824. E. T. Hughes, 123, Chancery-lane—An improved composition for rendering cloth, paper, and similar articles transparent and waterproof. (A com.)
826. A. B. D. Maurand, 25, Passage des Petites Ecuries, Paris—A translucid cylindric apparatus for bringing the former weights and measures into those of the present decimal system most easily and precisely, and vice versa.
828. W. Forrest and H. Duckworth, Blackburn—Imp. in looms for weaving.
832. H. Hamer, Kender-street, Old Kent-road—Imp. in tanning, and in apparatus employed therein.

[*From Gazette, April 17th*, 1863.]

Dated 4th December, 1862.

3248. C. H. Roeckner, Bristol—And improved method of constructing coffer dams and other similar structures for excluding or keeping back the flow of water and preventing inundations.

Dated 9th February, 1863.

355. H. G. Williams and R. G. Price, Bontddu, near Dolgelly, Merionethshire—An improved machine for crushing and amalgamating auriferous quartz, and pulverising and washing ores.

Dated 11th February, 1863.

374. R. Saunders, Croydon, Surrey—Imp. in pavements and floors, which imp. are applicable also to stairs and steps.

Dated 2nd March, 1863.

580. A. F. Pagny, 15, Passage des Petites Ecuries, Paris—A new agricultural implement for cultivating tubercles, roots, and all oil plants.

Dated 14th March, 1863.

695. R. Alexander, Islington, Liverpool—Imp. in mariners' compasses, and the parts in connection therewith, and in the application thereof to magnetic instruments.

Dated 16th March, 1863.

707. J. Smethurst, Royton, Lancashire—Imp. in the construction of ships and vessels, for the purpose of obtaining additional strength and motive power.
708. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of iron and steel. (A com.)

Dated 18th March, 1863.

727. B. Wren, Stockton upon-Tees—Imp. in cleansing and treating certain descriptions of wheat and other grain.
728. E. Legris, Bondeville, France—A new or improved machine for thrashing out the seed of flax.
731. W. Lorberg, Wyld's-rents, Bermondsey—Imp. in the treatment of rags, and obtaining valuable chemical products from the animal fibre therein.

Dated 20th March, 1863.

743. R. Couchman, 26, Noble street, St. Martin's-le-Grand—Imp. in articles or means for supporting or carrying ladies' parasols, bags, or other articles or appendages.
747. V. Houghton, 2, Merton-road, Kensington—Imp. in lamps and lamp wicks. (Partly a com.)

Dated 21st March, 1863.

756. G. A. Biddell, Ipswich—Imp. in locomotives, usually called "traction engines," to be used on common roads.
761. W. Clark, 53, Chancery lane—Imp. in the separation or obtaining of ammonia from azoted matters in the preparation of manure. (A com.)

Dated 27th March, 1863.

806. J. D. Asquith and G. Greenwood, Morley, near Leeds—Imp. in rag machines.

Dated 28th March, 1863.

812. A. Blouin, 79, Rue du Faubourg du Temple, and D. N. Mercier, 10, Rue Richelieu, Paris—An improved axletree, with linked levers for lifting.

Dated 31st March, 1863.

830. R. A. Brooman, 166, Fleet-street—Imp. in electric telegraph printing apparatus. (A com.)

Dated 1st April, 1863.

836. I. Rowland, Salford—An improved mileage apparatus for measuring and registering the distances public vehicles or private carriages travel.
842. G. T. Bousfield, Loughborough-park, Brixton—Imp. in steam boilers. (A com.)
844. R. Gavin, Edinburgh—Imp. in the preservation of perishable liquids during the withdrawal or consumption thereof.

Dated 2nd April, 1863.

846. J. W. Law and J. Inglis, Glasgow—Imp. in making moulds for casting, and in apparatus connected therewith.
848. D. S. Sutherland, 34, Great George street, Westminster—Imp. in protecting vessels of war and fortifications from the effects of projectiles.
850. J. J. Potel, St. Quentin, France—Imp. in furnaces and fireplaces, having for object the consumption or prevention of smoke.
852. G. A. Cox, Lochee, Dundee—Imp. in the treatment or preparation and manufacture of jute, hemp, flax, and other fibrous or textile materials.
854. A. B. Seithen, 5, Mansfield-place, Kentish Town—Imp. in casings, covers, or wrappers for bottles, jars, and other articles.

Dated 4th April, 1863.

858. J. Silvester, West Bromwich—Imp. in attaching guards to pressure gauges.
860. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus for bolting flour. (A com.)
862. A. V. Newton, 66, Chancery-lane—An improved construction of pressure gauge. (A com.)

Dated 6th April, 1863.

864. F. C. Bakewell, 6, Haverstock-terrace, Hampstead—Imp. in wicks for lamps. (A com.)

PATENTS SEALED.

[*From Gazette, April 17th*, 1863.]

April 17th.

2814. R. A. Brooman.
2816. W. E. Gedge.
2819. G. Haseltine.
2821. J. Clark.
2823. W. A. Turner and T. T. Coughin.
2825. H. L. Emery.
2826. J. H. Johnson.
2831. S. Witham and T. Wright.
2832. C. G. Clarke, jun.
2834. J. T. Cooke.
2835. R. A. Brooman.
2838. G. Haseltine.
2840. C. Tress and F. C. Belhomme.
2842. J. Spence.
2848. T. Fearn.
2860. E. H. Carbutt and G. A. Clough.
2887. F. Lipscombe.
2909. G. Darlington.
2912. W. Clark.
2939. G. Dickinson & E. Cooke.
2946. G. Speight.
2965. L. Gonez.
3032. W. E. Newton.
3033. J. Easton, jun., and J. C. Amos.
3146. A. V. Newton.
3190. F. Boecke.
3264. T. E. Blackwell.
257. J. H. Johnson.

[*From Gazette, April 21st*, 1863.]

April 21st.

2851. J. T. Stroud.
2852. W. S. Gamble.
2853. A. Chaplin and G. Russell.
2858. H. Ree.
2862. R. A. Brooman.
2870. P. S. Devlan.
2871. G. Luke and W. Luke.
2873. W. Owen.
2883. J. Chattwood.
2886. H. C. R. Joubert.
2888. W. J. Williams.
2890. F. L. H. W. Bunger.
2913. W. Clark.
2948. T. Gibson, T. Hall, and T. Davison.
2958. E. Stevens.
2963. J. Musgrave.
2968. E. Humphrys.
3011. W. Clark.
3034. T. G. Ghislin.
3106. R. Mushet.
3156. N. J. Amies.
3195. J. F. Delany and J. C. R. Okes.
3222. E. D. Johnson.
3418. M. Clark.
160. Sir W. O. Brooke.
176. S. Blackwell.
191. N. Clayton and J. Shuttleworth.
270. N. Clayton and J. Shuttleworth.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, April 21st*, 1863.]

April 13th.

922. J. Platt.
933. J. J. L. Bremond and L. Z. Thuilliez.
939. A. Jones.

April 14th.

943. Sir J. S. Lillie.
1124. J. Grimond.

April 15th.

958. T. Turner.

April 17th.

974. J. Fowler, jun., W. Worby, and D. Greig.
980. B. Lauth.
984. J. Willis.
1083. H. Rawson.
1088. G. T. Bousfield.
1090. H. Hutchinson.

April 18th.

1020. D. G. Berri.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, April 21st*, 1863.]

April 13th.

897. W. Smith.
948. J. Nasmyth and H. Minton.

April 16th.

923. W. Tytherleigh.

April 18th.

989. F. W. Blacket.
1194. A. V. Newton.

Journal of the Society of Arts.

FRIDAY, MAY 1, 1863.

ADDRESSES OF CONGRATULATION TO HER MAJESTY AND HIS ROYAL HIGHNESS THE PRINCE OF WALES.

The following address has been forwarded to the Secretary of State for the Home Department for presentation to Her Majesty:—

To Her Most Gracious Majesty the Queen.

We, the President, Vice-Presidents, Council, and Members of the Society for the Encouragement of Arts, Manufactures, and Commerce, in General Meeting assembled, desire humbly to approach your Majesty with our loyal and hearty congratulations on the auspicious marriage of his Royal Highness the Prince of Wales with her Royal Highness the Princess Alexandra of Denmark.

Impressed with the recollection of the important benefits the Society has derived for so many years from the guidance and wise counsel of his Royal Highness the Prince Consort, we feel it our grateful duty to express the heartfelt interest we take, in conjunction with every subject of your Majesty, in the marriage of his Royal Highness the Prince of Wales, and to express our most ardent hope that this event is but the commencement of a noble career which will become the source of true consolation to your Majesty, and of happiness to the Royal family, as well as prove a blessing on this nation.

And we humbly pray that your Majesty may long live to reign over a prosperous and loyal people.

The following address was presented to His Royal Highness the Prince of Wales at Marlborough House, on Wednesday, the 29th inst., by a deputation, consisting of Sir Thomas Phillips, Vice-President and Chairman of the Council, Mr. W. H. Bodkin, Vice-President, Mr. W. H. Marsh, M.P., Vice-President, and the Hon. and Rev. Samuel Best, Member of the Council:—

To His Royal Highness the Prince of Wales.

We, the President, Vice-Presidents, Council, and Members of the Society for the Encouragement of Arts, Manufactures, and Commerce, in General Meeting assembled, approach your Royal Highness with every demonstration of affection and respect, to express our sincere congratulations on your Royal Highness's marriage with her Royal Highness the Princess Alexandra of Denmark. We trust that this auspicious event, whilst proving a source of true and lasting happiness to your Royal Highness and your illustrious bride, will, by the influence of her virtues and graces, perpetuate that social excellence in the minds and habits of the people of which your revered mother, the Queen, supported by his Royal Highness the Prince Consort, has set so bright an example.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary.*

The subscription of each member is limited to one guinea.

The following additional names have been received up to the 30th ult.:—

Collins, William Job, M.D.	1	1	0
Fletcher, Joseph	1	1	0
Fussell, Rev. J. G. C.	1	1	0
Hellman, Christian	1	1	0
Hennet, Follet Charles	1	1	0
Holden, Edward	1	1	0
Holden, Isaac	1	1	0
Jones, Rev. William Taylor	1	1	0
Lutwidge, R. W., Skeffington	1	1	0
Nash, Edwin	1	1	0
Nicholay, John Augustus	1	0	0
Pakington, J. Slaney	1	1	0
Ruff, Edward	1	1	0
Shillito, George	1	1	0
Smyth, Samuel R.	1	1	0
Tucker, Henry	1	1	0
Ward, John	0	10	6
Whitworth, Joseph	1	1	0
Widnell, Henry	1	1	0

THE NATIONAL MEMORIAL TO THE PRINCE CONSORT.

Lieutenant-General Grey has received the commands of the Queen to acknowledge the receipt of the report of the Committee appointed to give Her Majesty their assistance in the consideration of questions relative to the National Memorial to the Prince Consort.

Her Majesty has directed that her best thanks may be returned to the Committee for the valuable services which they have rendered and the advice which they have submitted to Her Majesty.

The Queen very fully participates in the regret expressed by the Committee that it has

been found necessary to abandon, for the present, the idea of the Central Hall, which, combined with a personal Memorial, would have appeared to unite the tribute of national gratitude with the objects in which the great and good Prince took the strongest interest, and would also for ever have associated with the Memorial the recollections of the Exhibition of 1851. This regret is, however, modified by the expectation that whenever the Commissioners of 1851 may be in a position to appropriate the vacant space north of the conservatory in the Royal Horticultural Gardens to the purposes for which the estate was purchased, a Hall may still form part of the buildings to be erected there.

The personal memorial to the Prince was always the first object, and the Queen never contemplated the combination of the Central Hall until that was adequately provided for.

Under these circumstances, the Queen is happy to see that the Committee have recommended for selection the design of Mr. Scott, to which Her Majesty had already given the preference among the many beautiful designs submitted for her judgment.

Windsor Castle, April 22nd, 1863.

Sir Charles Eastlake, F.R.A.

THIRD REPORT OF THE PRINCE CONSORT MEMORIAL COMMITTEE.

To the Queen's Most Excellent Majesty.

We, the members of the Committee appointed by your Majesty to consider the best means of giving effect to your Majesty's wishes in respect to a Memorial to his Royal Highness the Prince Consort, humbly beg leave to report to your Majesty the result of our further proceedings with reference to the matters committed to us.

In our second report, dated the 27th of June, 1862, after referring to the difficulties which had compelled us to abandon the scheme of an obelisk, and to your Majesty's wish, communicated by a letter dated the 19th of April, 1862, from Lieutenant-General the Hon. Charles Grey, that we should turn our attention to some other mode in which the great object in view might be more satisfactorily effected, we stated that, in reviewing the various suggestions that had been made, we had become aware that a large proportion of the public appeared to be desirous of connecting the intended monument with some institution intimately associated with the Prince's name. We stated that a reference to his Royal Highness's recorded declarations and views had led us to conclude that there was nothing he had more at heart than the establishment of an institution for the promotion, in a largely useful sense, of science and art as applied to productive industry.

In considering the question of the site and special services of a building applicable to such objects we could not hesitate to express our opinion that the ground purchased with the surplus funds of the Great Exhibition of 1851—on which various establishments connected with art and science had already been placed, under his Royal Highness's auspices—would be the fittest for such a building; and, still guided by the Prince's wishes, as stated in the second report of the Commissioners for the Exhibition of 1851, we came to the conclusion that the most appropriate structure would be a Hall, forming a centre of action for men of science and art, where the results of their labours would be communicated, while, to use the words of the Commissioners, it would at the same time afford "the means of establishing the connection between them and the public, which would secure permanent relations of reciprocal interest."

In obedience to your Majesty's suggestion, communicated in General Grey's letter above referred to, we then sought the advice and assistance of some eminent architects. The following were those to whom we applied:—William Tite, Esq., M.P.; Sydney Smirke, Esq., R.A.; James Pennethorne, Esq., Philip C. Hardwick, Esq., Thomas L. Donaldson, Esq., George Gilbert Scott, Esq., R.A., and Matthew Digby Wyatt, Esq.

Those architects, in a letter dated the 5th of June, 1862, addressed through Sir Charles Eastlake to the Committee, expressed their opinion that the fittest site for the proposed Hall of Science and Art would be the vacant piece of ground at the northern boundary of the estate of the Commissioners for the Exhibition of 1851. We were ourselves enabled to state that the Commissioners, on their part, were pleased to express their readiness to reserve, for a reasonable time, a suitable site for the Hall, of the extent required.

In the proposed general arrangements the effect of the whole, as pointed out in our former report, would in a great measure depend on the straightening of the public road, in itself a considerable improvement, but which could only be effected by taking a few feet from the park. This object, trifling as is the proposed alteration, could only be obtained by an application to Parliament for its sanction. A reference to the subjoined plan will explain the nature and extent of the proposed alteration.

After consulting further with the architects referred to, we decided that the Memorial itself, with which the proposed Hall was to be associated, should be placed opposite the centre of the area to be occupied by the Hall, but on the higher ground north of the Kensington-road.

Having thus endeavoured to reconcile the original and primary object of a Memorial with the erection of a building in its immediate neighbourhood applicable to those especial objects which his Royal Highness the Prince Consort had been anxious to promote, we proposed, in our second report, to invite a certain number of architects to furnish detailed designs for the Memorial, with sufficient indications (as we afterwards explained) of the relative position, extent, and character of the Hall.

Your Majesty's "entire and cordial approval" of the scheme above described, and of the course proposed to be adopted, was communicated in a letter dated the 18th of July, 1862, addressed, as before, by General Grey to Sir Charles Eastlake.

The architects whom we invited to furnish designs were the same whom we have before consulted. Two of the number—Mr. Tite and Mr. Smirke—having declined the invitation, we addressed ourselves to Charles Barry and Edward M. Barry, Esquires. Those distinguished architects having accepted our conditions the proposed number of candidates remained unaltered.

The architects originally consulted by us did not omit to observe, in their letter dated the 5th of June, 1862, that "the sum available for the Memorial is supposed to amount to between £50,000 and £60,000, which probably would not be more than sufficient for a work of art worthy of the nation, including the cost of forming a site to receive it."

On our own part, in our invitation bearing date the 19th of July, 1862, to the seven architects, five of whom had affixed their name to the letter above quoted, we adverted to the same condition by reminding the candidates that one important consideration would be "the amount of the fund which may be available for the cost of the Memorial itself, for that of the proposed straightening of the public road, for the arrangement of the area in Hyde Park with its decorations, and if possible, for the Hall on the south side of the road."

The various designs were submitted in February last to your Majesty's inspection.

The ability, ingenuity, and taste displayed in all the designs are such as to prove the wisdom of the course suggested by your Majesty, and we trust that on future occasions, in questions relating even more directly and exclusively to sculpture, it will be found advisable to consult those whose studies and practice lead them to regard monumental works with reference to the site they are to occupy, and in relation to surrounding objects.

At the same time we are aware, on the one hand, that designs for statues or groups of sculpture by architects can only be required to indicate the position and dimensions of such works, leaving the sculptors themselves uncontrolled in all other respects; and, on the other, that the judgment ought not to be influenced by any defects of detail in such necessarily vague representations of sculptured forms.

In proceeding to the onerous duty of pointing out designs, one of which might, subject to your Majesty's approval, and with due modifications, be chosen for execution, we had to bear in mind the amount of the funds subscribed as compared with the estimates of the candidates. As regards the Hall, we had, in our second report, before referred to, stated that we could do no more than express our earnest hope that sufficient funds might be provided to insure its completion. What effect the announcement of a definite scheme and chosen design may produce we cannot anticipate, but we are bound to state that at this moment the amount subscribed barely exceeds £60,000. We have to add that the estimates which the candidates have submitted for the Memorial, irrespectively of the Hall, are, with one exception, larger—in some instances considerably so—than that sum.

Before submitting our opinion on the relative fitness in other respects of the designs we prefer, it may be necessary to advert to the general question respecting the durability of statues in the open air in this country. We observe that those architects who propose that the principal sculpture they have introduced should be of white statuary marble have placed such works within a building. Bronze, with or without gilding, and in some cases Sicilian marble (which latter it is assumed is durable even when exposed to the atmosphere), are the materials selected for external decorations in sculpture. We are of opinion that in any case, even including architectural details, the surface of the Memorial and its accompanying decorations might require to be cleaned from time to time; and that, assuming bronze to be preferred, a light colour might be adopted, and by such precautions might probably be preserved.

Next to the apparently indispensable condition of an estimate for the Memorial within the means hitherto contributed, we were disposed to consider the designs with reference to the important question of due connexion with the site and proposed structures on the opposite or south side of the Kensington-road. The ground gradually rising from the south points out a commanding site for the Memorial, and suggests a definite termination not only to the portion of the site in the Park, but to the whole area on the south side of the road, with the buildings now or hereafter to be comprehended in the estate of the Commissioners for the Exhibition of 1851. The Memorial, we conceive, should, in an architectural sense, be in intelligible relation and connection with that estate, in itself a monument of the Prince's efforts for the promotion of Science and Art; and as occupying the highest point in the ground, considered as a whole, should, in its mere plan as well as in due elevation, have the character of a boundary adorned with a fitting monument.

We are of opinion that, in its general conception, the design by Mr. Philip C. Hardwick exhibits an especial attention to these requisites.

In considering the general character of the different designs for the Memorial we find admirable suggestions for structures partaking of the nature of a mausoleum. But we conceive that the Memorial in the neighbourhood of institutions which, with regard to their present and proposed objects, exemplify the labours of the Prince for the public good, should rather convey the impression that it is a public tribute to his great qualities; and that while the proposed Hall of Science and Art would represent in the most general form the useful objects which his Royal Highness promoted, the Memorial itself should be essentially a national testimonial.

We, therefore, recur to the idea, that has been prominent at all times among civilised nations, of a statue in a conspicuous situation, sufficiently large to form, in reference to that situation, a commanding point of attraction, and with becoming accompaniments at different heights to enrich the mass and sustain the impression intended to be conveyed.

These conditions appear to us to have been carefully borne in mind by Mr. Hardwick; and, as regards the important question of expenditure, his is the only design according to which the Memorial itself, irrespective of the Hall, could be executed at a cost within the amount subscribed. At the same time, we are of opinion that the Hall forms so essential a feature of his general plan that its omission would greatly detract from the merits of his design.

We now proceed to notice, as especially worthy of your Majesty's favourable consideration, a magnificent design, by Mr. Scott, for a Gothic Cross, the statue being within the structure, but open to view, and, in a great measure, open to the air.

In the letter of the architects, in reply to your first invitation that they would favour us with their advice, among various kinds of ornaments which were by them considered objectionable, the Gothic Cross, if approaching the slender proportions of an obelisk or column, was included. We advert to this only to remark that, in the first place, Mr. Scott's design does not come under that particular description of structure; and, secondly, that in a letter dated the 9th of June, 1862, referring to the opinion above quoted, he claimed for himself perfect freedom of choice in the style of his design.

While admitting the somewhat sepulchral character of what are called Gothic Crosses, we cordially appreciate the feeling which led Mr. Scott to adopt in his design, to use his own words, " the style . . of the most touching monuments ever erected in this country to a Royal Consort," and to give to an architectural structure the character of a vast shrine expressive of the value attached to the statue which it protects.

We, therefore, do not dwell on the objection, likely to be urged, of a certain want of originality in a monument of this kind, because we believe that the beauty of this example, if it could be carried into execution without sacrificing the richness and completeness of its effect, would abundantly compensate for any actual or imagined resemblance to other structures coming under the denomination of a Gothic Cross.

It will be observed that Mr. Scott's proposed monument is not essentially connected with any present or proposed buildings on the south side of the public road. But, inasmuch as it would correspond with the central line of the area on that side—the statue, of course, fronting in that direction—we conceive that the required connection might be sufficiently attained by the arrangement of the surrounding ground; and, although the isolated and independent character of the structure in itself would seem to fit it for any open situation, we by no means consider such a circumstance of sufficient weight to open again the question of site.

A Gothic monument in the position already assigned for the Memorial might, in the opinion of some judges, involve as a consequence that the Hall, if ever to be built, should be similar in style to the Memorial, and consequently, again, dissimilar from the buildings already in existence on the estate of the Commissioners for the Exhibition of 1851. We think, however, that the intervening space might be a sufficient reason for some change of style, if desirable, in the Hall.

Having noticed these general, but, as we consider, not insuperable difficulties, we come to a much more formidable objection: the cost of Mr. Scott's proposed Memorial, after reducing the height from 185 to 148 feet —an alternative proposed in his printed description—and not without some other changes, cannot, we fear, be estimated at much less than double the amount subscribed.

To this must be added that no calculation is made for the cost of laying out the ground (in this case an indispensable addition), nor for that of straightening the public road.

Under these circumstances we still think we are bound to submit our opinion, in the first place, as to the relative merits of the designs. That opinion, after a careful and repeated comparison of those designs, considered irrespectively of cost, is in favour of that by Mr. Scott. The difficulties which present themselves in regard to the estimate can only be met, first, by abandoning for the present the project of a Hall; and, secondly, by such an addition to the present available amount as would secure the completion of Mr. Scott's monument without sacrificing its chief characteristics.

It is not without extreme regret that we regard, even as a possibility, the indefinite postponement of a project which his Royal Highness the Prince Consort appeared so earnestly to contemplate. In relinquishing the objects of utility to science and art which the Hall and its accompaniments would have unquestionably promoted, and in recommending the adoption of Mr. Scott's design, we have the consolation of reflecting that we in some measure revert to your Majesty's original intention in proposing the erection of a monument, in the usual acceptation of the word, with groups of statuary round its base.

But, we repeat, even for the execution of such a monument alone the sum contributed will be insufficient. It would be unbecoming on our part to offer any suggestion as to the means by which that sum might be augmented; but we venture to think that the liberality of Parliament would not be appealed to in vain, and that by the aid of the House of Commons the monument would assume a character in all respects national, and thus be worthy of the Prince to whose memory it will be dedicated.

We beg leave to recommend that all the designs should be submitted to the inspection of members of the Legislature, and ultimately to that of the public.

We humbly subjoin, as an appendix, various papers referred to in this our report.

DERBY, C. L. EASTLAKE,
CLARENDON, WILLIAM CUBITT.

Westminster, March 25th, 1863.

TWENTIETH ORDINARY MEETING.

Wednesday, April 29, 1863.

The Twentieth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 29th inst., Sir Thomas Phillips, F.G.S., Chairman of Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Dickson, Lieut.-Colonel Lothian Sheffield	10, Stanhope-terrace, Hyde-park, W.
Donaldson, Sir Stuart, Bart.	22, Rutland-gate, S.W.
Guthrie, Thomas Anstey	7, St. George's-terrace, South Kensington, W.
Maurice, Joseph............	3, Langham-place, W.
Stansfield, Josias Logan	Hersham, Surrey, and Reform Club, S.W.

The following Candidates were balloted for and duly elected members of the Society:—

Blore, John	8, Michael's-place, Brompton, S.W.
Bolton, Thomas Henry ...	14, Thornhill-crescent, N.
Boothby, John L.	18, Notting-hill-square, W.
Chatfield, Frederick	12, Pall-mall, S.W.
Clarke, Joseph, F.S.A....	13, Stratford-place, W.
Clement, John H.	3, Gloucester-terrace, Church-street, Kensington, W.
Freyberg, James	11, Grosvenor-street West, Eaton-square, S.W.
Waters, Robert S.	St. Giles, Dorset.

The following Institutions have been received into Union since the last announcement:—

Hackney Working Men's Institute.
Oldham Science School.

The Secretary called attention to a new form of barometer exhibited by Mr. Symonds, of which a description will be found at page 419.

The Paper read was—

THE VARIETIES OF COMBUSTIBLE MINERALS USED ECONOMICALLY, CONSIDERED IN REFERENCE TO THEIR GEOLOGICAL POSITION AND RELATIVE VALUE FOR CERTAIN PURPOSES.

By Professor D. T. Ansted, M.A., F.R.S.

The use of combustible minerals for various economic purposes certainly dates far back in history, and is traceable, in various ways, even to times to which history does not refer. I have myself seen in Hungary, at various points on the outcrop of a very important seam of coal that does not appear ever to have been worked, clear proof that the coal has been removed from the crop and burnt in large quantity, the shale beneath being reddened and converted into brick. That this was systematic, and not accidental, there is ample evidence. The Chinese, also, have in this, as in many matters, antedated the discoveries of European nations. Still, however, so far as any important result is concerned, the whole economic history of combustible minerals lies within a very narrow compass, and hardly exceeds three centuries.

The one name Coal, has been popularly applied to all mineral substances that can be used for heating purposes, and that will continue to burn, and serve as fuel when once ignited, without being constantly fed with other combustibles. Sulphur and phosphorus are excluded from the list, owing to their deleterious properties and low heat of combustion.

It is to be regretted that the name Coal has not been more limited and more correctly defined, for it is well known that, both geologically and economically, there are many such minerals, some of which are admirably adapted for fuel, others yield excellent gas, others supply oils of various kinds, others are useful for pavement, and some are rarely employed except for ornamental purposes, as gems, or pseudo gems. All these are combustible minerals in some sense. A certain part of all of them consists of carbon—a certain part is earthy mineral, that will not burn; a part of most of them is hydrogen and oxygen gas, and most of them contain more or less water, so intimately mixed, that it cannot be got rid of by air drying; their respective properties depend on the proportions according to which the various component parts exist, and it seems possible, and is certainly very convenient, to separate them into several groups, bearing this in mind.

In the following remarks, then, I shall speak of (1.) Anthracite, meaning the varieties of combustible minerals

that consist of carbon only, with no appreciable per-centage of hydrogen or oxygen. (2.) Coal, including those that contain so much hydrogen and oxygen as to burn freely with flame, but so little water and ash that they are available for getting up steam. (3.) Lignite, the varieties of coal in which the per-centage of water is so large as to affect their value seriously as a fuel. (4.) Bituminous shale, including those mineral admixtures of clayey matter with carbon and hydrogen that are valuable for gas, and for distilling, especially at low temperatures. (5.) Mineral Oil, Bitumen, and Asphalte, names given to certain combinations of hydrogen and carbon, very abundant in certain localities, and recently found in large quantities in North America, but which, from their becoming fluid either at ordinary temperatures, or when heated, cannot be regarded as fuel in any proper sense. Some, as the asphalts, are used for pavement; others, such as mineral oils, are chiefly valuable for distilling.

1. ANTHRACITE.—This substance is abundant in some parts of the North Welsh coal-fields, and abounds also in parts of the great North American coal-fields. Often almost pure carbon, or, at least, as free from foreign ingredients as fine diamonds, and more so than graphite, it is yet a true coal, and has certainly been accumulated in the same way as the ordinary coal of commerce. There is an intermediate condition between it and bituminous coal, known as steam coal. The texture of anthracite is often loose and rotten, but sometimes very compact; it even assumes an imperfectly crystalline state; it does not take fire readily, and hardly keeps up its own combustion. Burning with intense local heat, it radiates heat badly, and is difficult to use either in the furnace of a steam boiler or in iron making. For either purpose it requires a special adaptation of the furnace, and a strong draught that would be unfit for coal. It demands, in fact, a large and rapid supply of oxygen gas, and this, combining with the carbon, forms carbonic oxide. Much carbonic acid gas is given off during combustion. Still, though long objected to, anthracite has made its way surely enough, and is now always used when other fuel cannot be got in abundance, that is, either more cheaply or more conveniently. Geologically, anthracite occurs very distinctly amongst the coal measures, though often below them. There is little probability of its having been formed or modified by the local application of heat to beds that have once been coal. The complete absence of free hydrogen gas and water in it must be accounted for in other ways than by assuming it to be half-burnt, but the chemist has not yet explained to the full satisfaction of the geologist what theory is the best and most probable. There is no very special use of anthracite; none, that is, for which it is better adapted than other varieties of coal. It is certain that a much larger proportion of anthracite occurs in the coal measures on the American than on the European side of the Atlantic.

2. COAL is by far the most abundant, the most valuable, and the most important of the mineral combustibles, but as it is well-known and has often been described, and the statistics of its extraction and consumption have recently been given to the Society by Mr. Hunt, I do not here intend to give any further details. Exceedingly abundant, and much worked in England, Wales, and Scotland, it is also plentiful in Belgium, Prussia, and France; there are large deposits in Spain, and it is even more widely-spread and more conveniently worked in North America than in Europe.

The varieties of coal are many, from steam coal, which connects it with anthracite, to jet, which is a variety of lignite. Chemically it is a compound of carbon and hydrogen with oxygen and nitrogen gases, sulphur, and earthy ash, chiefly consisting of silica. Coals containing little hydrogen, but still burning with some flame, are called steam coals. They are valueless for gas. The coals readily converted by partial burning in a closed retort into the substance called coke, contain generally from 10 to 25 per cent. of volatile substance expelled in coking, and yield a fair supply of gas. The Newcastle varieties in burning become soft, swell and cake together; they are thence called caking coals. The Midland varieties retain the form of the coal during burning. Those varieties that contain least sulphur make the best coke. The varieties richest in volatile substances are used chiefly in gas making, but in proportion to their excellence in this respect, they fail in heating power. The best of these are of closer texture and finer grain than true coal; they do not soil the fingers, and they are compact enough to admit of being sculptured into ornaments. They are known as cannel coal. Beds of this kind occur among true coals with ordinary varieties of coal above and below them. They are of the usual thickness of the other beds of the district, and differ from them in no respect but in this superabundance of gaseous matter and capacity for different economic treatment. In Scotland they are called parrot.

Coal occurs in the British islands more abundantly in rocks of a certain geological date than in any others, and this position has been apparently so far confirmed by the principal beds worked for many years in other European countries, that geologists have sometimes assumed that more favourable conditions existed for the production of the mineral at that period than before or since. A marvellously rich tropical vegetation, owing to a higher temperature of the whole globe, an unusual amount of carbonic acid gas in the atmosphere, favourable to vegetation but unfavourable for the higher animals, and rapid movements of the surface at that ancient period, have all been assumed as characteristic of the coal period. Arguing from imperfect evidence is, however, always dangerous, and has generally proved unsound. More recent observation has shown that, not only is there good coal of much older date than the oldest part of the carboniferous period, but that almost all the rocks of the secondary period contain it in one part of the world or another; and my own investigations have recently laid open a coal field of undoubted excellence and very considerable magnitude, in the east of Europe, belonging to the tertiary period.

This observation of a sound tertiary coal in Transylvania has led me to the general consideration of the subject which I venture to offer to the Society in this communication. I will not here give the geological detail, which more fitly belongs to another place, but I may assure the Society that the fact is beyond a doubt.

Since, then, there is Liassic and Oolitic coal in very large quantity, some of it in England, although chiefly in the east of Europe, and in Virginia, in North America; since, also, there are deposits of true coal in the newer secondary rocks of the age of the chalk, and good beds also of true coal of the Tertiary period, it is quite clear that there can be no necessity to resort to extraordinary conditions of the earth and its climate to account for the formation. Wherever and whenever large quantities of vegetable matter have been accumulated and covered more rapidly than they have decayed, there seams of fossil vegetation have been produced. Where also the chemical conditions have been favourable there have these seams been converted either into coal or such variety of mineral combustible as we find to represent it. Whenever the undulations of the surface were favourable to the successive accumulation of deposits of this kind by a general depression, the beds formed have been preserved.

3. LIGNITE.—Very frequently, especially in the deposits of the secondary and tertiary periods, the process of change from rotten vegetation to coal has not been complete, and has produced only the material called lignite. By lignite I understand all those varieties of combustible that contain a definite per centage of water, and that when exposed to the weather for some time, break up into fragments, and ultimately fall to powder. It is assumed, but it is by no means certain, that these would ultimately be converted into coal.

Most, but not all of the lignites contain a large per cent-

age of ash, but this is an accident. Many of them resemble wood in texture; others remain in thin leaf-like layers, while a few varieties strictly and accurately resemble the best coal when they are first taken out of the earth. The test of time however never fails to bring out the truth; nor does it take long to apply the test, for the dirty appearance lignites soon offer is a certain indication of coming change. In practice the water they contain greatly interferes with their use, for a certain portion of the really valuable part of the fuel must be consumed to convert this water into steam, and thus there must be a deduction made both of this quantity, which is altogether wasted, and also of the whole weight of water and ash contained, before the available per-centage of useful combustible is ascertained for practical estimate. The heating power even of the best of the lignites is thus very low compared with inferior coals. It is to be regretted that this, which is the only true practical distinction between lignites and coals, should be lost sight of by some geologists who have denominated tertiary and even secondary coals lignites, simply from their geological position.

The chief use of all the varieties of combustible mineral we have hitherto been considering, is either for fuel, or, by destructive distillation, for gas making; and the varieties yielding the largest per-centage of gas are generally the least fitted for fuel, *cæteris paribus*.

4. Bituminous Shale.—We come next to a class of minerals intermediate in their nature, containing much carbon and much hydrogen in their composition, although these elements are not combined to form true bitumen. These minerals also contain so large a per-centage of clayey substance that they belong to what geologists call shale, rather than to coal. There are many kinds known. The richest are found in Scotland, with and amongst coal; and it is not unlikely that some of the partings between coal that have often been thrown away as worthless, are of the same nature. Under various names, such as Boghead coal, Torbane-hill mineral, and many others, these have become familiar and important, owing to the introduction of a method of distillation at comparatively low temperature, originally introduced in France more than 30 years ago. Owing to the poverty of the shales made use of, the inventor of this method struggled for some time with little success. About twelve years ago the same method was introduced into Scotland, by Mr. Young, and the result in the case of the exceedingly rich shales named above was found sufficiently important to enable that gentleman to acquire rapidly a large fortune. The minerals in question lie on the border-land between coal and shale. Some of them pass into coals, and samples might easily be obtained which burn like coal. Others are much poorer and unlike coal in all respects, but it is very difficult, if not impossible, to draw a line that shall separate the two classes of minerals. All agree, however, in refusing to coke, and in retaining their slaty character after burning. The existence of a very clear passage from mere mineral oils through the shales that most resemble coal to those containing less than five per cent. of oils of all kinds on distillation, would not be difficult to make out. I have myself seen some such passage in the varieties here stated, namely:—

1. American rock oils—Canadian mineral oils.
2. Trinidad pitch, or bitumen. Rangoon naphtha—Pitch of Zante.
3. Chapapote of Cuba. Albert coal of New Brunswick.
4. Torbane-hill mineral.
5. Boghead and other rich coal-like Scotch minerals.
6. Cannel or Parrot coal, of Lismahago, and elsewhere.
7. Rich bituminous shales of Autun and other carboniferous rocks.
8. Poor bituminous shales of Autun and elsewhere, from the coal measures.
9. Posidonia shale and other lias shales, brown and black, but all bituminous.
10. Bituminous schist of Mansfeld, loaded with fossil fish. White paper coal.
11. Dorsetshire shales—Kimmeridge coal, &c.
12. Cretaceous shales, in the Ionian islands of Santa Maura and Zante.
13. Tertiary shales, brown coal and paper coal, used in Germany.

There is not one of these varieties of mineral (all available for the same purpose) that is not really distinct from coal in essential points, but some of them seem to pass into true coal much more completely than others. Thus, the cannel coals more especially might practically be regarded as one or the other—coal or shale—almost according to the use required to be made of them. On the other hand, the lignites, and brown coals of the tertiary period, and some of the lias shales, although actually distilled to profit for various kind of oils and paraffine, bear so little resemblance to any kind of fuel that they could never for a moment be mistaken for fuel, and as a matter of fact never have been so regarded.

5. Bitumens.—But in the list of minerals just given there are included several that are equally little to be regarded as bituminous shales. They are in fact bitumens. Of these, the rock oils of America, not long since the subject of a description in this place, are among the most remarkable. The mineral pitch of Trinidad and Zante, and the Rangoon naphtha are only slightly less valuable. The remarkable Albert coal and the Cuban chapapote, are also examples, rather of bitumen than of bituminous shales, though the latter less perfectly than the former. The per-centage of foreign matter in some of these is comparatively small, and their analyses agree in some points not unimportant. The Albert coal I have not myself seen *in situ*. It has been well examined and described in the Journal of the Geological Society. The chapapote I have seen underground. It is a singularly irregular deposit, and cannot be regarded as regularly bedded. It resembles the examples of bitumen occasionally found in hollows and veins, in the older sandstones and in the old limestone rocks of England and Scotland. It does not retain either its thickness or mode of development to any distance. Like the irregular deposits of asphalt occurring amongst loose sand, it seems to have a very different origin from coal, and may have been conveyed for some distance in a liquid state.

Such are the principal varieties of combustible mineral. Many that were once regarded as of little value are now recognised as extremely useful, and are largely imported, or are used where they are found. Hardly one exists that does not possess some special value and some use for which the rest are less available. But, certainly, after the common coals used for fuel and gas-making—the shales from which light illuminating oils, heavier oils, lubricating oils, and paraffine, can all be obtained, are among the most interesting; they are also the least known.

It is certain that the slaty and stratified minerals, capable of distillation for these very useful purposes, are not strictly bituminous. The term bituminous shales is familiar, but not correct, since no bitumen, properly so-called, is contained in them. They agree, however, in yielding valuable hydro-carbons by a process of distillation now familiar enough; and in this they agree with some of the bitumens properly so called. It has been proposed to call them pyroschists, but this name is, I think, yet more objectionable.

In directing the attention of the Society to the subject of shales valuable for distillation, I would point especially to the considerable number of substances of this kind that exist, most of which are still untried. I believe the partings of coal seams, the tough brown and black shales of the old red sandstone and Silurian periods, and the so-called bituminous schists of many of our own rocks, many of them not highly coloured, may prove extremely valuable. Some of them would probably fail, but the means

of ascertaining their value are neither troublesome, tedious, nor costly.

I would here point out that it is hitherto chiefly the black schists, about whose value there can be no doubt, rather than those that apparently occupy doubtful ground between coal and shales, that have been used for slow distillation on the Continent; while only the rich and remarkable Boghead and Torbane-hill minerals have been extensively employed in the British Islands. It is not everywhere that such rich or profitable minerals can be found, but valuable results might perhaps be obtained from minerals that have not yet been much thought of. In this case, as in the case of iron ores, there are many very unpromising materials that turn out when examined to be the most valuable of all.

Having endeavoured to place before you, in some order, the various combustible minerals that have been used economically, let me next allude to the geological position occupied by them. This is the more desirable, as by geology only are the localities to be known where similar valuable minerals may be looked for.

There is no doubt that the coal measures have hitherto yielded the most numerous and the richest bituminous shales, as well as the largest and most valuable supplies of coal. It is equally certain that in England the deposits of this period are most likely to retain their reputation in all these respects. Anthracite, steam coal, bituminous coal, cannel coal, Boghead and Torbane-hill minerals, are all of the same age. But, although this is the case in England, and, to a great extent, in Belgium, Prussia, France, Spain, and Bohemia, and in the chief American coal fields, there are still marked differences in the position of the different minerals, and there are wide and important deposits of coal, some older, and others much newer. The Indian coal fields are probably very new. The Virginian coal field have long been known to belong to the secondary period. There are excellent lias coals worked in various places on and near the Danube, in Hungary—there are cretaceous coals in Hungary, and excellent tertiary coal as well as lignite in the same country. It is also remarkable that, although in England and Scotland the valuable and rich bituminous shales are close to the coal, in France and elsewhere they are often altogether removed. The great deposits of bitumen in North America are below the bottom of the whole series. Rich beds of shale, yielding fifty per cent. of all kinds of oil, near Antun, in France, are far above the highest bed of coal—the Lias bituminous shales are quite unconnected with any workable coal seams, and so are those of tertiary age on the Rhine. There is, then, no geological limit of the age for these minerals; neither is there any limit of colour and appearance. Many of the blackest shales are worthless, and some that are of a very pale brown are very rich—experience and analysis are required to form an opinion in any particular case.

The relative value of the combustible minerals, of all of which carbon forms a large proportionate part, is not, on the whole, difficult to determine. Pure carbon does not afford the best fuel. Pure, or nearly pure carbon such as is seen in some samples of anthracite, is, indeed, a very difficult and unmanageable combustible, and can hardly be regarded as an economical fuel at all. A very strong draught, or mixed gases supplied rapidly, are necessary to enable it to continue burning when once heated. A coal containing a moderate per-centage of oxygen and hydrogen gases, and a reasonably small per-centage of ash, is the best for all purposes as a combustible. Some kinds, especially of the Newcastle coals, cake, or run into a kind of slag while burning; other kinds, such as Yorkshire and Lancashire coals, burn through without caking, and fall to a white and red loose powdery ash. None of them, however, retain their exact form when burnt, either in an open fire or in a retort.

Most of the cannel coals, and those varieties called Boghead coal, and Torbane-hill minerals, are very valuable for distillation of all kinds, but they retain their form, and behave like slates in the retort. Some of them, however, are capable of being used alone as fuel. They are all especially rich in gases, paraffine oils, and lubricating oils, but their peculiar value in this respect is accompanied by a corresponding diminution of their value as true coals. The lias coals of Europe and America, the oölitic and cretaceous coals, and such tertiary true coals as are known, all resemble rather the Yorkshire and Lancashire varieties than the caking coal of Newcastle. Most of the French coals and many of the Belgian varieties are of the same kind. It is difficult to draw an exact line that shall separate the true coals from the richer, blacker, and more coal-like shales used for obtaining gas or paraffine oils, but it has long seemed to me that the slaty character, recognised in burning, affords a good practical definition.

Regarded as fuels, all the coals are exceedingly superior to lignites, for the reason already given, namely, that the coals are almost entirely without hygroscopic water, while the lignites, without exception, contain a marked per-centage. Much of the value of lignites is abstracted by the inevitable necessity of evaporating off this water before the rest of the material can come into use as a combustible. It is, however, clear that this is no very serious disadvantage when the object is to obtain the oils by slow distillation, and thus some of the poor paper-coals or tertiary shales of Germany have been used with fair result for this purpose, although utterly unfit for fuel, while the richer shales attain a value very far exceeding that which could belong to them as combustibles. Still more are the non-combustible bituminous schists inferior to coal as fuel, though they possess great value for the purposes for which they are specially adapted. It is to obtain a more general recognition of this value, and as a suggestion to those who are in the way of discovering available minerals of this kind, that I have chiefly been induced to bring forward this subject to-night. The minerals that may thus be used are so numerous, varied, and widely-spread—many of them are so unlike combustibles, and the results obtained from them are so immediately valuable, that they may almost be regarded as a new source of mineral wealth. As, in the case of iron, we are now employing numerous varieties of ore formerly neglected and despised, so I feel that the time is not far off when the collection of shales for distillation will be an important occupation, not only in the British Islands, but in most other countries. Bituminous shales are far more common than is generally thought. In limestone countries they are rarely absent, and they are hardly less frequent associated with clays.

It is a point of considerable importance that some of the lignites may also prove available for distillation, but of this there is at present hardly sufficient evidence. The assistance of the chemist is required to determine how far the varieties that are most abundant are available for this purpose, and whether some modification of the process or the addition of some ingredient may render profitable operations at present not worth carrying on. The demand for light oils, for illuminating purposes and for paraffine, seems only limited by the price, and the manufacture is extending in most countries of Europe. It is certain that there is no geological period and no rock that may not contain useful minerals of this kind.

Mineral oils and true bitumens are less common than bituminous shales, but they also are more widely dispersed than is generally thought, and when found in large quantity they possess great value. Some are obtained from considerable depth, and are very tenacious; others, as naphthas, are thin and float on water; some occupy definite geological positions in certain rocks, while a few, comparatively rare, offer peculiar mineral combinations, and are found described in mineralogical works by special names.

I have recently visited one of the localities where such bitumens occur in considerable quantity, and as it is not

in many places that the conditions are so simple, I will briefly allude to them. I speak of the pitch wells in the island of Zante. This island, like all the other islands off the west coast of Greece and Albania, and like the main land adjacent, consists almost entirely of limestone, with alternations of marl and gypsum. Limestone is everywhere at hand, and most of the hills—all the higher hills and mountains—are exclusively composed of it. But there is a volcanic band not far off, and the presence of sulphur is strongly marked in many places—in some by the mineral itself—in others, by sulphur springs—and elsewhere, by large deposits of gypsum—the carbonate of lime being converted into sulphate. There are also indications of bituminous shales in more than one of the islands.

The pitch wells of Zante are in a hollow, between hills of limestone, opening on one side towards the sea, on the south-west of the island. A very singular naphtha-spring occurs in a corresponding position at the north-east end. The latter locality is very inaccessible, and the quantity of mineral seems small, but the former springs are easily visited, and on rather a large scale.

The pitch or bitumen here comes near the surface in various parts of a boggy tract, barely above the sea level. The bog is intersected with wide drains, but wherever the ground is dug into for a few feet, there bubbles up slowly, but in considerable quantity, a thick bitumen, which can easily be removed, and is as rapidly replaced. It is too tenacious to rise readily above the water, but a little is constantly oozing, and there are large bladders of bitumen a few inches below the clear and perfectly pure water that seems to rise with them. Large quantities of this substance have been occasionally taken for local purposes or for ships' use, for which it seems well enough adapted without any preparation. It has been used in this manner for the last two thousand years whenever the island has been inhabited.

That this curious spring is connected with a bituminous deposit of some magnitude there can be no doubt, but the cause is not clear. It may be, that the bituminous shales cropping out on the flanks of the mountain of Skopo, on the other side of the Bay of Kieri, where there is also a large quantity of gypsum, may exist here in large quantity, and in a somewhat different state, the pitch-like substance there forming a bituminous shale being allowed here to ooze away in a half-fluid state. The limestones in this part of the world probably overlie large sheets of lava, through the crevices and fissures of which gases and vapours arise and affect the overlying rock.

As a general conclusion to the remarks I have offered to the Society in this communication, I would point out—First—That the variety of combustible minerals available for practicable purposes is large, perhaps larger than is generally thought, and that such minerals form several significant groups. Secondly—That they belong, all of them, to all geological periods, no one being of necessity limited to any part of the earth's history. Thirdly—That there is less advantage taken of many of them than their real importance deserves. And, Fourthly—That much has yet to be determined as to the circumstances under which the organic kingdom of nature has been enabled to provide these large stores of carbon and hydrogen as mineral contributions to the well-being of man.

DISCUSSION.

The Chairman had now to invite them to proceed to the discussion of the paper which had just been read by Professor Ansted, and he thought they would all agree with him that it was one of very great merit—almost a pattern for any scientific treatise, inasmuch as it dealt in the least possible degree with conjectures or speculations, and was reasoned out in a thoroughly scientific manner. Professor Ansted had called attention to what, no doubt, was a very interesting subject, viz., the existence of bituminous schists, which hitherto had not been very much used for the service of man, and it might be that those schists would play as important a part in the history of economic production as coal itself had done. It was a very remarkable fact, and one which they did not sufficiently dwell upon, that coal had only been in general use for a very limited period. Even in the manufacture of iron coal was hardly used in the beginning of the last century, but now it was of enormous importance in its application to this industry. Similarly, coal was not used in producing the textile manufactures of this country till after the middle of the last century. Up to that time water power was the agent by which a very large proportion of our productive industry was obtained. Now, however, the use of coal had increased to an enormous extent, and had greatly enlarged the poductive powers of mankind by means of steam. It was the great source from which the enormous productive energy of this country was derived. Its application they knew was almost universal; within the last two years it had been employed to produce many beautiful colours which were used for dyeing. It seemed difficult, in fact, to indicate any limit to its application. It was distributed from this country throughout the colonies, and indeed throughout the world. Extensive as were the deposits of coal in almost every part of the globe, English coal was sent to a very large extent—an extent which increased year by year—to other countries. This subject seemed to him to be one of abundant interest; and he trusted that the paper would lead to an animated discussion.

Mr. Thomas Sopwith, F.R.S., entirely concurred in what had fallen from the Chairman with regard to the merits of the paper they had just heard. He considered it to be quite exhaustive as far as it went, and to be, as it were, an index to one of the most important fields of observation that could occupy the attention either of that Society or of the public at large. A few hundred years ago coal was prohibited even in dwellings, and the Chairman had properly observed that it was only of late that its consumption had become so very important and general. The amount of that consumption was now very distinctly given in the statistics which were regularly published by the Department of Practical Geology, in Jermyn-street, under the direction of Sir Roderick Murchison, the mining statistics being placed under the able care of Mr. Robert Hunt, who had for a number of years succeeded in collecting a most valuable amount of information upon this subject. A great deal has also been done by that institution towards drawing the attention of the public to those various kinds of combustible minerals, from different districts, to which Professor Ansted had referred. Now, the question of coal, as regarded its conservation, was one which did not properly come within the province of the paper under discussion. That was another, but a very important, question, and he would only refer to it in this point of view—that he believed the great and increasing consumption of coal would very rapidly give the greatest importance to an accurate study of those numerous other minerals which had been referred to. He should think that the effect of the paper would be to draw the attention in many localities to this subject, and he would strongly recommend that in country places collections or museums of these minerals should be made, as they would be found objects of great local value, and of much interest to visitors. Probably, duplicates of the specimens exhibited might be sent to persons who would be willing to make experiments upon them, and he hoped these would be made with the same skill and accuracy as were employed on the building stone to be used for the Houses of Parliament. A commission was appointed by Government for the examination of every description of stone throughout the kingdom. Each specimen was subjected to analysis, and experimented upon as to its strength, absorption of moisture, and all other qualities. He believed that published experiments

upon materials such as those now before them would be very valuable, and that the subject was one well worthy the attention of Government, as well as of men of science. He did not know that it was possible to do more at present than to express the very high opinion he had of the able manner in which Professor Ansted had brought before them an epitome of this subject.

Mr. P. L. SIMMONDS said the subject so clearly and so ably brought before the members by Professor Ansted was one that ought to be fully and fairly discussed, looking at the great interests which were involved in the adequate supply of the combustible minerals. Important as were these interests, viewed only in a national point of view, to ourselves for the maintenance of that supremacy which had long marked our manufacturing interests, we were not the only country concerned in the question. All foreign countries, and our numerous and thriving colonies, were deeply interested in the present and future supply of carboniferous fuel. Moreover, the progress of steam navigation was so rapid all over the world, that a supply of steam fuel at various convenient coaling depots was of essential necessity. Steam had become either the prime mover or the adjunct in the greater part of our mercantile marine and Royal Navy, and was also spreading extensively among foreign nations and the various British dependencies. It was only in a few quarters like the North American rivers that wood could be obtained for steam fuel. Year by year our export of coal was increasing, and last year it reached 8,300,000 tons, of the value of 3¾ millions sterling, and nearly two-thirds of this went to the Continent. In the ports of the United Kingdom alone the entries of steamers were nearly 9,000 annually, besides naval steamers; and our Australian and other colonies had now a very numerous steam fleet. The export of machinery and mill work to the amount of £4,000,000 annually, involved also the supply of a large amount of coal to keep them in action. The examination of combustible minerals in our colonies had not yet been so general or systematic as it might have been, but as most of these had now a competent government geologist, inquiries would no doubt be set on foot to ascertain the economic value of many of the lignites, shales, and schists which were to be found in them, as was evidenced by the admirable and extensive collections forwarded to the International Exhibition. In the instructions forwarded to the colonies, the desirability had been urged upon them of forwarding samples of coal in sufficient quantities to have their steam value tested at the Woolwich arsenal, and in the case of Vancouver, New South Wales, and Nova Scotia, this had been complied with, although he was not aware whether the reports of the trials and analysis had yet been published. Now that the economic value of very many of the bituminous shales for destructive distillation was better understood, and their products of such great commercial importance, a more general knowledge of the localities where they were found, and their universal character, was very necessary. As he saw present his friend Dr Milligan, of Tasmania, he was sure that gentleman could furnish the meeting with some useful information on the coal formations and dysodile of that island. The limits of the great coal-field of New South Wales were at present imperfectly known; it was found to extend into Queensland, and to re-appear in Tasmania, but it had not been practically opened out in either of those colonies. The total produce of coal in New South Wales, in the last ten years, had been 1,780,000 tons, of which more than one half had been shipped to India, China, and the neighbouring colonies. The present appliances of the collieries at work, in the colonies were equal to the production and shipment of 20,000 tons weekly, the average price for good screened coal being 12s. to 14s. the ton. The further development of this great mineral resource, it was stated, was only arrested by the want of miners. If this want were supplied, there was no doubt that in the course of a few years the coal-fields of the southern hemisphere would furnish gas and steam fuel throughout the Indian and Pacific Ocean. In conclusion he might state that a very interesting report on these coal-fields, by Mr. W. Keene, the government examiner, was published in the New South Wales Catalogue of the International Exhibition of 1862.

Dr. MILLIGAN said he should be very glad to give any information in his power respecting the coals of Tasmania, although as regarded the coal deposits of New South Wales he knew but little, excepting that the coals were good and existed in large quantities. In Tasmania they had got three or four different sorts of coal. They had a good bituminous coal, in seams up to thirteen or fourteen feet thick, on the east coast; and at the southern end of the island they had an extensive deposit of anthracite. On the west coast they had a jet-like lignite, which yielded a large quantity of gas, and burnt to a white flocculent ash, without leaving any other residuum. They had, also, besides, on the north coast, upon the River Mersey, seams of a shale nearly akin to dysodile, highly combustible, burning freely, with a very rich flame, and disagreeable fœtid odour, and yielding a very impure gas. Its combustibility depended, apparently, upon resinous matter imbedded in the shale—a resin which could be separated from the substance of the shale into innumerable fine granules by trituration and washing. It had not yet been applied to any economic purpose. Some oils had been experimentally distilled; but they could never be extracted on a large scale except for local purposes, as rock oils from America could probably be imported even to that distant part of the world cheaper than they could be produced on the spot. He ventured to say, that on the east coast, when the coal came to be thoroughly opened out, it would be found to be a valuable steam fuel. It was of the same age, whatever that might be, as the steam coal of Newcastle, New South Wales. The Rev. W. B. Clark, of Sydney, a well-known geologist, on examining the specimens of coals and associated shales from the east coast of Tasmania, pronounced the fossil impressions contained to be identical with those existing in the coal series of Newcastle, New South Wales. There was a very marked difference in the fossil impressions of the anthracite of the south, and the bituminous coal of the east coast, and he never found the anthracite beds associated with the latter, except on one occasion, when he met with one seam in sandstone of the bituminous series, on the east coast of Tasmania, and that was a purer anthracite than any other in the island. The coal beds had been very much broken up, in the centre and along the eastern seaboard, into isolated patches, by the eruption of greenstone. The principal seam of coal varied from eight to fourteen feet thick, and in one place, about thirteen miles from the sea, where the seam was twelve feet thick, and could be worked by an adit, an incline might be had from 1,200 or 1,300 feet of elevation down to the sea, along which the coal might be run with little difficulty. This, however, had not yet been entered into as a commercial undertaking. On the east coast, immediately upon the sea, and close to a shipping place, some new mines had lately been opened out, and he recently saw by the newspapers that one of them had been described by the Commodore on the station as a very promising coal for steam purposes, it having been tried on board his vessel. That at the Mersey River on the north coast was also a good steam coal. The anthracite at the southern end had not been used extensively for steam purposes, but it had been used in combination with wood, and found to answer well. In the immediate vicinity of Hobart Town there was a considerable quantity of coal; the seams, although not more than about twenty inches thick, covered a considerable area. He was not aware that he could add any more to what had been already said, except perhaps to mention the great number of parts, eastern and central, at which coal had been discovered. Coal mines extended from Hobart Town, more

or less, to the centre of the island. Northward, in the neighbourhood of Launceston, they had indications of the coal measures having been swept away by denudation. They occurred there, but not extensively. However, from the great number of places at which coal was found, he had no doubt, when thoroughly explored, it would be proved that Tasmania possessed vast resources in her coal fields, and that they would ultimately not only minister to domestic industries, but prove very valuable to the commerce of the empire in the long run.

Mr. Paul wished to draw attention to one particular referred to by Professor Ansted, namely the essential characteristics and differences of those kinds of combustible minerals belonging to the carboniferous series. Taking, in the first place, those minerals commonly known as coal, there might be selected from among the numerous varieties certain of them presenting well-marked characters of difference. Thus, for instance, anthracite—the free-burning "steam-coals" of the Welsh coal-field,—the coals of the Lancashire district and Midland Counties, the caking coals of the Tyne district, and the cannel coals of Scotland. Between well defined specimens of these varieties of coal there were great apparent differences, but a closer examination showed that those differences were only in degree. Coals might be easily found which, while presenting all the apparent characteristics of anthracites, more closely resembled bituminous coal in their composition. Between the bituminous coals of the Tyne district and the "steam-coal" of Wales there was, in many instances, no kind of difference in composition. Between the cannel coals of Scotland and the bituminous coals of Newcastle, the difference in composition was small as a rule, and there were cannel coals which approximated more closely to the coal of Newcastle and Lancashire than they did to the better and more characteristic varieties of cannel coal. The term bituminous, when applied to coal in the sense of its containing actual bitumen, such as that of Trinidad or Jews' pitch, was a false designation. The character properly denoted by the term bituminous, as applied to coal, was the existence in the coal of a portion of its substance which was capable of being volatilised by heat, and which, though it was not true bitumen, was analogous to bitumen. This character bore no recognisable relation to the amount of hydrogen in the coal; but coals differed considerably in regard to the amount of bituminous substance they contained. Thus, for instance, some of the well-known steam coals of Wales, such as the Resolven, Graigola, Merthyr, Llangennech, and others, were, in composition, almost identical with the Hartley coals. The really important practical difference between these coals consisted in their yielding different amounts of volatilizable substance when heated. The Welsh coals yielded but little; the Newcastle coals yielded half their weight in some cases. These volatile products, being swept away from the furnace before there was time for their being burnt and rendered available as a source of heat, appeared at the chimney mouth as smoke. Hence arose the difference sometimes found in the fuel value of these coals; for the volatile substances given off were difficult to burn, unless special provision was made for the purpose. It was owing to this circumstance that in the examination of coal for the Admiralty, the value of the Newcastle coals was placed so far below that of the Welsh coal. A mistaken system of trial was adopted; both kinds of coal were tried under the same conditions, whereas, if the mode of using the coals had been adapted to their peculiarities, a different result would have been obtained. The experiments subsequently made, at the instance of the coal owners of the Newcastle district, proved most conclusively that the Hartley coals had a higher fuel value than was assigned to them by the results of the Admiralty trials, and that they were, in this respect, equal, and in some respects superior, to Welsh coal. Throughout the whole range of varieties of coal, though it was possible to select typical specimens that were widely different, still no essential difference could be recognised. Between all of those typical varieties there were intermediate varieties so numerous and presenting such minute gradations of difference, that it was impossible to draw any absolute line of distinction between them. It was very important that these facts should be borne in mind, more especially since it was convenient to use the term cannel coal, caking coal, free burning coal, &c., and to comprise the whole of the varieties of coal, excepting anthracite, under the term bituminous coal. The bituminous character of coal from the carboniferous series of rocks was a well marked feature of distinction from lignite, which, though it contained volatilizable substance, approximated more closely to wood in its nature generally, and in the nature of the volatilizable portion. Considering only the applicability of a mineral as fuel, it was equally impossible to establish any absolute distinction between coal and those minerals, associated with it, which were capable of being burnt, or which at least contained combustible substance; but which differed from what was practically recognised as coal, in containing a larger amount of earthy substance, and which were generally called bituminous shale. A mineral of this kind, containing 20 or even 30 per cent. of ash, might be used as fuel at the pit's mouth, but it would not be sent up to London for use while other minerals could be got to send, that contained only 2, 3, or 5 per cent. of ash. In the absence of minerals of the latter kind, which were commonly called coal, and in the absence of other fuel, some of the bituminous shales, or such minerals as that of Boghead, might be used as fuel. Altogether the application of the term coal was merely conventional, and it was a convention determined altogether by circumstances. But from another practical point of view there were differences that had not hitherto been much regarded, and which might be made a means of determining a difference between coal and shale. It was, for instance, a recognised characteristic of coal, that it would leave when heated a fixed carbonaceous residue, called coke, amounting to a considerable portion of its weight. Coals varied very much in this respect; anthracite gave from 93 to 80 per cent. of coke. The Welsh steam coals gave from 10 to 70 per cent., while the Newcastle coals gave only from 70 to 60. The cannel coals gave from 60 to 40 per cent. The Boghead mineral gave 30 per cent. of fixed residue. But this mineral contained 22 per cent. of ash, while ordinary coal did not contain more than 5 per cent. of ash. Therefore, to find the difference between coals and other minerals, in this respect, the ash must be deducted, and the ratio of the fixed carbonaceous residue to the volatizable portion ascertained. Then, there was a very marked difference recognizable. No true coal, as the term was generally understood, gave less than one-third its weight of fixed carbonaceous residue. Even the Albert coal of New Brunswick, which was in many respects an exceptional coal, containing less than 1 per cent. of ash, and being applicable for the manufacture of oil and paraffine, yielded 33 per cent. of fixed carbonaceous residue, and 67 per cent. of volatile substances. Newcastle coal would yield 66 per cent. of fixed carbonaceous residue, and 37 per cent. volatile substances. The cannel coals, on the average, would yield half their weight of volatile substances, and an equal portion of carbonaceous residue. But the Boghead mineral would yield 88 per cent. of volatile substance, and only 12 per cent. of fixed carbon. Here was a wide difference from coal generally, and even from cannel coal. Certain bituminous shales again, that were not used as fuel, but for the manufacture of oil by distillation, would yield from 80 to 95 per cent. of volatile substance, and only 5 to 20 per cent. of fixed carbonaceous residue. Among the shales here referred to there was one from Vouvant, analysed by Dumas, and worked by Selligue for oils and paraffine in 1833, and another, an English shale, analysed by Laurent, in 1833. It was a remarkable fact that the increase in the proportion of volatilizable substance, as compared with the fixed carbonaceous residue, bore a direct relation to the amount of earthy substance in the minerals. This was very noticeable in

some of the poorer kinds of cannel coal, containing a large amount of earthy substance, or ash. The greater the amount of ash, the greater was the ratio of volatilizable substance to the fixed carbon. In this respect the Boghead mineral appeared as far removed from ordinary coal as it was by the external characters it presented and the amount of ash it contained. It resembled bituminous shale far more than it did coal, and it could not be doubted that, by reason of these characters, it would not be used as fuel, nor would it be used at all if it were not for its capability of yielding gas and oil. Another difference between coal and the bituminous shale associated with it, consisted in the nature of the oily products obtainable from them by distillation, as well as their amount. For use as fuel, it was not a matter of any great importance what was the nature of the volatile products given off by a mineral, provided they were combustible and could be burnt. But as regarded the use of these minerals for the manufacture of oils, the nature of the volatile products, no less than their amount, was of paramount importance. Coal properly so called, yielded oily products that were different in kind from those yielded by bituminous shales and by the cannel coals that were most closely allied to bituminous shale. This was a most important distinction between them as regarded the manufacture of oil, and in reference to the question that had been raised as to whether the Boghead mineral was a coal or a shale. Judging from that character which rendered this mineral so eminently well suited for that purpose, it should unquestionably be regarded as a shale, and not as a coal, by reason of its far greater resemblance in that particular to shale than to coal. Considerable attention had already been directed to the use of bituminous shales for manufacturing oil from them by distillation. The first attempts that were made, long ago, to establish the branch of manufacture were made before there was any demand for the oils which were now so largely used as a source of light, and for lubricating purposes, and it was only since the use of these materials became general on the Continent, and a large demand for them had been created, that any attempts to manufacture them in this country proved successful. Now, the demand seemed to be limited only by the extent of the supply. This manufacture had been carried on since 1833, in France and in Germany, and it was now being prosecuted in the neighbourhood of Linlithgow, with some shales occurring at Broxbourne; and at several other places between Glasgow and Edinburgh there were works of a similar nature. As regarded the use of anthracite as fuel, the objections that were formerly found to obtain against it were only due to the misapplication of this mineral as fuel. Means had now been found of using it with success, and, in many instances, with great advantage, inasmuch as its large per centage of carbon rendered it highly valuable when intense heat was required. Bituminous coal, a century or so since, was objected to in a similar manner. People had been accustomed to use only wood-charcoal, and it was found that bituminous coal, used like wood-charcoal, was not suitable for smelting iron and other metals. But it was very soon found that this was only a consequence of improper use, and the right mode of application was soon learned. Now, as was well known, scarcely anything else was used as fuel for these purposes.

Professor Tennant would like to say a few words upon the mineralogical part of this subject. The gentleman who had just spoken had been alluding to various substances which he (Professor Tennant) was enabled to exhibit. He first exhibited a piece of soft bitumen, so soft that he could stick a pin into it. It was something like india-rubber, and was a substance which could be obtained in large quantities on the rocks of England, it being very well known about Derbyshire. He then showed a piece of cannel coal, a very compact material, differing very widely from that to which he had previously referred. Then he had different specimens of anthracite, varying considerably with regard to their general characters. There were also other materials, graduating down to the common jet, found in abundance in the lias of Whitby and that neighbourhood. Then they came to the different varieties of lignite. These materials had all undergone various changes. They were all deposits, many of them animal, mixed with a large quantity of vegetable matters. Some of them did not contain vegetable matter, but had been derived, as he believed, solely from animal. They had before them a mineral called albertite, from New Brunswick, a specimen exhibited in the International Exhibition. Just before that exhibition was closed, however, a gentleman of the name of Mackenzie brought several specimens from a place in Rosshire, and stated that he had found them whilst excavating for some railway works, and that the workmen had used it for cooking their food, and lighting them at their work. He (Professor Tennant), in company with the Rev. Mr. Honeyman, who was well acquainted with New Brunswick, examined the specimen with regard to its mineralogical character, and in all respects it agreed with that found in New Brunswick. They then compared its chemical properties, and found the result the same. Mr. Mackenzie had drawn up a paper on the subject, and had sent it to the Geological Society. In the Brazilian Court at the Exhibition, there were many specimens exhibited of those shale substances, which yielded oils in large quantities. In the Canadian Court, also, there were some valuable specimens in a geological point of of view. He held in his hand one of the most interesting slabs that could possibly be exhibited. It was a specimen from the Collingwood district, and in it could be found the remains of 400 or 500 trilobites. There was one large slab in which there were thousands of them. In the Canadian court was issued a most valuable catalogue, which was given away to persons making application for it. He then exhibited a specimen of petroleum rock, from which oil had been distilled, showing its bituminous shales. In the catalogue a very full description was given, and he should recommend that that portion* bearing on the subject should be printed in the *Journal*. With reference to the coals exhibited in the Exhibition, there were some specimens of Borneo coal which he believed was from the tertiary period, samples of which might be seen in the Museum at Kew. It contained a large quantity of amber, resin, &c. He was extremely obliged to Professor Ansted for bringing this subject before them, and he regarded this paper as, in a commercial point of view, one of the most valuable they had had for some time. The paper read by Mr. Hunt some months since was also most interesting, in which he had spoken of the enormous value of our coal, amounting to fifty-one millions annually. It was very desirable that such subjects should be, from time to time, brought before the Society in the able manner in which this had been done both by Mr. Hunt and by the gentleman who had favoured them with the paper that evening.

The Rev. J. G. C. Fussell said Professor Ansted spoke of the desirableness of experiments being made in different parts of the country, where shales more or less promising, or rather unpromising, might occur. If he could give them one or two suggestions as to the best way of conducting those experiments, it might be of great assistance to them. If they had access to gas-works, would it be desirable to submit the specimens to the retort?

The Chairman then asked their authority to tender thanks to Professor Ansted for his valuable and interesting paper. Professor Tennant had called their attention to the enormous interests involved in the subjects introduced for their consideration by Professor Ansted, and he had mentioned a most stupendous fact—that the coal-mines amounted in value to £51,000,000 sterling. We now talked of millions very glibly, but our forefathers would have talked of them in a far different way, and

* See next page.

would have laid much greater emphasis upon the word. But really when they came to consider it, it was an enormous wealth to be produced by the coal mines of this country. And when they recollected, too, that those coal mines were not only so valuable in themselves, but that they really gave a practical value to all our manufactures, it did seem impossible to overestimate the importance of this topic. Certainly a very important feature in Professor Ansted's paper was that it partly related to non-combustible materials, or, at all events, to minerals not applicable for fuel, but still very important for distillation. This was scarcely a less important subject than the consideration of fuels, and he thought it must have interested them all. He would now ask them to do—what he was sure would give them great pleasure—to give their thanks to Professor Ansted for his valuable scientific paper.

Professor Ansted would like to say a word or two in reply; and first of all with regard to the specimens exhibited. They were all of them worth looking into by anyone who took an interest in the subject, and was familiar with minerals of the kind. They were not intended to be examples of the best kinds of shales, but were from very interesting localities, and many of them from localities entirely new. As to the mode in which the shales which might be found in various parts of the country could be tested, in order to determine their value, he thought the wisest and safest way, generally speaking, was to refer at once to some respectable authority, to put the mineral into the hands of a chemist. If the matter was not worth the expense of a small practical analysis, it was not worth trying whether it was a substance of importance or not. In many cases, as would be seen by any one who looked at the specimens before him, the appearance of the shales did not agree with the value they possessed. It would be impossible for any person not exceedingly familiar with minerals of this class, to detect their real value for the purpose of slow distillation, which yielded the illuminating oils. He was quite aware, with regard to the definitions of those products to which Dr. Paul had alluded, that it was impossible to draw a line sharply. No one could be better aware of the fact than himself. He was glad, however, that Dr. Paul had directed the attention of the meeting to it. It was desirable to draw these distinctions as far as they could, and for that reason he had urged, in two or three places in the paper, the desirableness of defining certain terms in common use, such as bituminous shale, coal and shale, and so forth. He thought in most cases bituminous shale was sufficiently distinct from coal to justify its being called by that distinctive name. Coals of different kinds were too closely alike to admit of any names to distinguish between them. He did not wish to obtain any greater definition than the subject required; but at the same time he thought it as well they should define where they could, as in practice sometimes a great deal depended upon the use of the proper term. He was glad the paper he had been enabled to bring before them had met with their approval, and he hoped it would be found useful. Many people in the north and other parts of the country would be very much benefited if they were to look out for these shales, and get some one to ascertain whether they really contained a workable per centage of oils. There was no doubt this was a subject increasing in importance, and one which would go on advancing in interest.

Mr. Winkworth said, that being a director of a gas company in which was involved half a million of money in the production of gas in France, he thought it would be very desirable if they could find any cheaper material than coal, and if there were any means by which shales could be made available for the purpose of generating gas. He supposed if shales were used they would not be able to get coke as in the case with coal?

Professor Ansted remarked that he was afraid it would always be the case with shales that they would leave no residuum of any practical value at all. In all the specimens shown, the residuum was almost entirely a stone, and had no possible value for fuel purposes. That would put a stop to the use of shales for making gas in the ordinary way. Besides, it did not pay.

Mr. Winkworth said that in consequence of the mildness of the winter, coke had gone down so much in price, so much lower than ever before, that he could almost fancy it would answer their purpose to use shales, and put the coke question aside.

The Secretary announced that on Wednesday evening next, the 6th inst., a paper by Dr. Andrew Wynter, "On Bread-making, particularly with Reference to the Condition of those Employed in its Manufacture," would be read.

The following are the portions of the Catalogue of the Minerals of Canada referred to by Professor Tennant:—

Petroleum or Rock Oil.

1. Enniskillen, lot 16, range 2, Canadian Oil Company, Hamilton.

a. Gum or mineral tar from the surface.
b. Crude oil from the well.
c. Refined or burning oil.
d. Lubricating or machinery oil.

Natural springs of rock oil have long been known in several localities of Western Canada. Two of these are in the township of Enniskillen, in the southern part of which are two patches of an acre or more, covered with a layer of several inches of viscid mineral tar or asphaltum, which has resulted from the drying up of the petroleum of these springs. Wells sunk in their vicinity, to a depth of from forty to sixty feet, through the superficial clays, encounter a stratum of gravel, resting on the surface of the rock beneath, and often filled with oil, giving origin to what are called surface wells. On boring into the underlying soft fossiliferous shales and limestone, fissures are met with at various depths, from which rise abundant supplies of oil, often accompanied with inflammable gas, and with water, which is sometimes saline. These fissures, which also supply the surface wells, are apparently connected with the oil-bearing strata of the corniferous limestone, which is from 200 to 300 feet below the surface, in Enniskillen. Within an area of about four square miles in the first three ranges of this township, there were supposed to be, in August, 1861, about seventy wells, yielding more or less oil. Of these, forty were surface wells, that is, wells sunk from 40 to 60 feet, through the drift clay and gravel, to the rock beneath. Some of these latter, which had yielded but little oil, gave abundant supplies by boring into the rock. The oil-bearing fissures or veins, in adjacent wells were met with at depths varying from 36 to 100 and even 150 feet from the surface of the rock. One of the most abundant occurred at 60 feet. In some few cases the oil from the borings rises above the surface of the ground, constituting what are called flowing wells.

It is not easy to know the amount of oil which these wells are capable of supplying; since from the great difficulty in getting it to market, arising from the want of good roads, few of the wells are regularly and continuously pumped. Some of those which were bored in July and in August last, are said upon good authority, to have yielded from 400 to 500 barrels of oil in a week or two after having been opened; but the reservoirs provided, being filled with oil, the pumping of the wells was suspended. Two bored wells, belonging to Mr. Williams, which were the only ones continuously wrought in August last, are said to have yielded together, during some months, from 20 to 25 barrels (of 40 gallons each) daily. About 6 miles to the northward, at Petrolia, on lots 13 and 14 of ranges 10 and 11 of the same township, 16 wells had been sunk last August; of which 12 were surface wells, and had yielded large quantities of oil. Several of these had been wrought for nearly twelve months, and were sup-

posed in that time to have yielded 1,000 barrels. Other wells had recently been bored to a depth of nearly 200 feet, but yielded less oil than the surface wells. The wells of this region seem, thus far, to be less important than those in the southern part of the township. The oil from the deep or rock is somewhat lighter and more fluid than that from the superficial wells, which is very dark coloured and somewhat viscid.

Great expectations have recently been excited by a flowing well, known as Shaw's, which was sunk to a depth of about 200 feet, and when first opened, a few weeks since, was supposed to yield, for a short time, 2,000 barrels of oil in 24 hours, which flowed into a stream close by and was lost. This well is, however, said to have been since closed, so that the discharge is under control. Another recent well, near by, known as Bradley's, is nearly as abundant. The experience in Pennsylvania has, however, shown that the supply from these flowing wells soon diminishes, and eventually fails. Adjacent borings sometimes appear to be connected with the same oil-yielding fissure, and to affect each other's supply; in some cases air passes down one shaft when the other is pumped.—*Corniferous formation, Devonian.*

2. Tilsonburgh, Watkins and Inglis, Hamilton.
   a. Crude oil from the well.

Near the village of Tilsonburgh, in the township of Dereham, natural oil springs occur, and two wells have been bored in the Devonian limestone, which is here covered by about 40 feet of clay and sand. One of these had been sunk 36 feet in the limestone, and had furnished when seen, in August, a few barrels of oil.

In the townships of Zone, Mosa, and Orford, on the banks of the Thames, oil springs abound for a distance of about 4 miles. These, like the other natural springs mentioned above, furnish but small quantities of oil; several wells have, however, been sunk in the clay, and the rock beneath has been drilled. One of these, at a depth of 70 feet in the clay, had yielded about 40 barrels of oil.—*Corniferous formation, Devonian.*

3. Bertie, lot 13, range 1, geological survey.
   a. Specimen of the limestone yielding the oil.

In a quarry on the lot indicated, 2 oil-bearing beds, one of 2 and another of 6 inches, are seen; they are made up in great part of corals of the genera *Heliophyllum* and *Favosites*, in the pores of which the oil is lodged like honey in a comb. Other coral beds in the same series, however, are quite free from oil. The limestone beds above and below these are compact, and not at all impregnated with oil, which, even in the coral beds, is seen, when these are freshly broken, to be confined to the fossils, and not to be uniformly disseminated in the layer. When the rock is quarried, the oil flows out, and may be collected on the water in the bottom of the quarry. The facts observed with regard to the petroleum springs in Canada and the United States, would seem to show that they are always on the lines of anticlinals, along which the oil from its superior levity accumulates, and afterwards, by the pressure of water, is raised to the surface through the natural fissures, which generally occur upon anticlinals. The oil-bearing limestone underlies an area of 7,000 square miles in Western Canada. This limestone is of marine origin, and contains no organic remains but those of marine animals; so that we are led to conclude that these hydrocarbons have been derived from a peculiar decomposition of their tissues. These tissues, as is well known, differ but little from those of the plant, which in many more recent formations have given rise to bitumens. We may suppose that many soft gelatinous animals, and perhaps plants, whose traces have disappeared, may have contributed to form the petroleum of these coral beds.—*Corniferous formation, Devonian.*

BITUMINOUS SHALE.

1. Collingwood, lot 23, range 3, geological survey.
   a. Shale from the bed.
   b. Burning oil.
   c. Lubricating oil.

The shale of Collingwood, on lot 23, range 3, yields, when distilled, from 3 to 4 per cent. of tarry oil, which, by the usual process of rectification, affords oil fit for illumination and lubrication. Works were erected by Messrs. Pollard and Macdonell in October, 1859, consisting of 24 retorts, and capable of yielding about 250 gallons of oil daily, by the distillation of from 20 to 30 tons of shale. The available bed of shale is 7 feet in thickness, and the material was delivered broken for the retorts, at 20 cents the ton. The cost of the crude oil was said to be 14 cents the gallon, and for a while the works were carried on successfully, a ready market being found for the oils; but the works were repeatedly destroyed by fire, and the oils from this source coming into competition with petroleum from the oil wells at Enniskillen, the enterprise for the present was abandoned. — *Utica formation, Lower Silurian.*

ARE GAS HOLDERS LIABLE TO EXPLOSION FROM THE EFFECTS OF EXTERNAL FIRE?

By THOMAS W. KEATES, F.C.S.*

During the progress of a recent conflagration which happened in the immediate neighbourhood of one of the largest of the metropolitan gas works, considerable excitement and alarm were experienced by many of those living in the adjoining streets or present in the crowd, from the idea that if the fire extended to the gas holders, which at the time were filled with gas required for the supply of the public and private lights, an explosion of unexampled force would be the result. It was stated that many persons hastened away from the locality when they heard that there was a probability of the flames reaching the gas works; some thinking that if an explosion occurred, even the dome of St. Paul's might be endangered; others, that at least Blackfriars-bridge would be destroyed; and, indeed, the public mind was filled at the moment with that vague and unreasonable sense of danger, which, operating upon great masses of people, effectually prepares the way for the most dangerous panic.

It is very desirable, both in the interests of the gas companies and of the public, that the erroneous ideas which gave rise to these really absurd, although in some respects natural, fears, should be corrected. There is but one way in which this can be done, that is, by affording information concerning the agents and forces involved in the question, so that a clearer conception of their nature may be acquired, and the undefined terrors, which in this, as in other similar cases, are engendered and fostered by ignorance, may be removed by a rational consideration of the physical and chemical laws to which such agents are subject.

In accordance with this view, there are, then, to be considered—first, the character of coal gas with reference to the question of explosion; secondly, whether explosive mixtures of coal gas can be produced by circumstances attendant upon a fire extending itself to the gas holders.

With regard to the first part of the inquiry, it must be remembered that the gaseous mixture which we know as coal gas, is not, *per se*, an explosive, although it is an eminently combustible, material. When ignited, it burns with the greatest rapidity, evolving an immense flame, and producing a very great amount of heat; but there is no more tendency to explosion than when coals, or any other combustible substances, are burning in a furnace. Certain constituents of coal gas require a very high temperature to inflame them, others are readily inflamed at a red heat; but the lowest point at which any one of its constituents may be inflamed must be taken as the index of the point of inflammation of the mixture,

* Reprinted from Newton's *London Journal.*

and this may be, perhaps, set at a red heat. When coal gas burns in the air, it is, of course, at the expense of the atmospheric oxygen, the process simply consisting in the oxidation of the carbon and hydrogen of the gas; and this action is necessarily confined to the exposed surface. Under such circumstances, the oxidation goes on gradually, and a certain time is required to bring in contact the combustible atoms and the oxygen; we have then burning, but no explosion. To effect complete oxydation, coal gas consumes, or rather combines with, about two and a half times its bulk of oxygen, which are equal to more than twelve times its bulk of atmospheric air. If, however, the required quantity of oxygen, or of air containing the oxygen, be mixed with coal gas before the latter is inflamed, and means of inflaming the gas be then applied, combustion will not progress gradually, as it does when the gas alone is inflamed, but will occur atomically as it were—that is, each atom of gas finding in its immediate proximity an atom of oxygen, the union between the two will take place throughout the whole volume of the gaseous mixture instantaneously, and a violent explosion will be the result. To produce this explosion, oxygen, in certain proportion, must be mixed with the gas before ignition. In the absence of oxygen, previously so mixed, there can be no explosion.

Sir H. Davy, in his important and interesting experiments upon this subject, found that light carburetted hydrogen, the most powerfully explosive of the gases, required about seven times its bulk of atmospheric air to be mixed with it to produce the greatest explosive effect; practically, it may be calculated that from eight to nine times its bulk of air will produce the most explosive mixture with coal gas; but, as was remarked before, the air and gas must be mixed before inflammation. No matter how rapidly the air may be supplied when the gas in burning, that will merely increase the fierceness of the combustion; but there will be no explosion. To form an explosive mixture, the gas must be present in quantity varying from 7 to 25 per cent. of volume; if it fall short of, or exceed, that proportion, it will burn away quietly, and not explode. So it will be perceived that, in the contents of the gas holders, we have to deal with a material which is combustible in the highest degree, but which in itself, even when burning, has no tendency to explode, and which cannot be made to explode excepting by changing its normal state by previous admixture with a foreign gas, viz., oxygen.

There is another property of coal gas which relates to this inquiry, and which it possesses in common with all matter—that is, expansibility under increased temperature. When a gas is heated, its volume is augmented. For every degree of Fahrenheit's thermometer this augmentation equals $\frac{1}{480}$th part of the bulk of the gas at 32°, so that the volume of gas being 480 cubic inches at 32°, it would be 481 at 33°, 482 at 34°, and so on. The qualities of coal gas, then, which relate to the question of explosion of gas holders are—combustibility, capability of forming explosive mixtures with oxygen gas or air, and susceptibility of having its bulk or volume increased by rise of temperature.

In relation to the second part of the subject, it remains to see how far circumstances arising from the application of heat or flame to the exterior of a gas holder could so effect or modify its contents as to produce explosion, as many persons have seen cause to dread. In the gas holder itself we have an apparatus very well calculated to preserve the gas which it contains from any admixture with the external atmosphere; and, indeed, under all ordinary circumstances, such admixture is impossible. It must be remembered that the gas holder, formed of strong plate iron, is so arranged that it is only capable of moving vertically, under the guidance of firmly constructed iron rods and pillars, and that, during all its movements, its lower edge remains immersed in a tank of water; were it not so, its contents could not be preserved at all, as it must be remembered that gas holders *rise*, in consequence of the elastic raising power of the gas which is forced into them, and are not *suspended*. The moment the gas is removed by any means from the holder, the latter sinks by virtue of its weight, which operates as a powerful expulsive force, and is, in fact, the only force which sends the gas through the almost endless ramifications of pipes by which it is distributed for public consumption. Are there, then, any conditions in which the gas in the holder could become mixed with a sufficient quantity of air to be rendered explosive; those conditions, of course, being produced by the action of heat applied externally to the holder?

Some years since it happened, at one of the London gas works, that a portion of the upper part of the heavy iron framework which guides the holder became detached, and, falling upon the top or crown of one holder, crushed through, making a large hole in the iron plate. The weight of the holder caused the gas to rush through this opening with great velocity; reaching a light which was burning near, it became ignited, and, as may be supposed, a flame of immense size and force—a sort of gigantic blow-pipe flame—was produced: as the aperture was of considerable size, the whole of the gas was, however, expelled from the holder in a very short time, and no damage was done—nothing in the remotest degree resembling explosion having occurred. Suppose, during a great fire at a gas works, that by any means the gas holder became perforated, the only result would be that just described; and even if the perforation were made in a part of the holder from which the flame might prove a means of extending the conflagration, there would be no danger of explosion, unless, as we have seen before, the gas holder contained a mixture of gas and atmospheric air or oxygen. Is there, then, any probability of such an explosive mixture being produced in a gas holder through the effect of an external fire?

If a gas holder, filled with gas, were exposed to the action of violent flame, it is evident that, in accordance with the law of expansion, already explained, the volume of the gas would be rapidly increased. It is scarcely in the nature of things that a large gas holder should be uniformly heated on every side; but, for the sake of illustration, let it be supposed that the whole mass of the gas is raised to 1,000°, a very high temperature, about equal to bright red heat;* under these circumstances the volume of the gas would be nearly tripled, so that from a gas holder capable of containing 3,000 cubic feet, nearly two-thirds of the contents would be expelled by mere expansion —that is, if the holder were at first filled to its full capacity. As the holder cannot rise out of the water of the tank, owing to the iron framework by which it is held, the excess of gas (that is, 2,000 cubic feet) would be forced under the edge of the holder, and would bubble up through the water, a thing which not uncommonly happens on a limited scale in gas works when the holders are over-filled; as the gas thus escaped, it would, of course, inflame, and a succession of irregular fierce combustions, so to speak, would be the consequence; but as the gas could not previously have been mixed with air, there would be no explosion. Now, let us suppose the source of heat to be removed, the fire about the gas

* I am here intentionally ignoring the circumstance that no such temperature as this could ever exist in a gas holder and its contents in the presence of the water in the tank; so soon as the bulk of the gas became heated much above 212 deg. Fahr. the water would give off steam from its surface, and this steam would mix with the gas, and, by increasing the volume of aeriform matter in the holder, expel the gas, the place of which would soon be occupied by steam alone. This is obvious when we consider that one cubic foot of water would produce more than 1,700 cubic feet of steam, and that it would, consequently, require less than two cubic feet or about twelve gallons of water to generate steam enough to entirely fill such a holder as that spoken of. For the sake of the argument, however, I am supposing that the water of the tank remains unaffected by the temperature of 1,000 deg. Fahr.

holder to be subdued, for example, the contained gas would cool, and, in cooling, would contract to its normal density; this being so, it would only be capable of occupying one-third of the capacity of the holder, which would, of course, descend as the contraction progressed, and the result would be, not that of any mixture of air and gas had been produced in it, but that the gas holder would be found less elevated from the tank by two-thirds of the height which it reached when first subjected to the action of the heat.

Let us, however, take an extreme case, in which the holder, filled with gas, expanded to three times its normal volume, is suddenly cooled, and in which, from the action of the fire, the guides or pulleys of the holder itself have been so deranged that the holder cannot descend upon the contracted gas—it is obvious that the gas, in cooling, will, as in the former case, be only capable of filling one-third of the holder; the water of the tank cannot rise to fill the vacant space; atmospheric air would therefore pass under the edge of the holder, or blow through the water seal; and very shortly the contents of the holder would consist of about one-third of gas and two-thirds atmospheric air; even then the mixture would not be explosive. Davy's experiments show that, when the gas present in the mixture exceeds from 20 to 25 per cent., it burns quietly, and does not explode; and in the above case—a most unlikely one to occur—the gas is present in the proportion of 33 per cent. If a gas holder became fixed by any means, in the manner spoken of, and by accident the side of the tank were broken down, so that the water flowed away from the holder, the contained gas would be in communication with the atmospheric air; in that case, however, the mixture of the two would be but a slow operation, as by its superior levity, the gas would continue to occupy the suspended holder until sufficient time had elapsed for diffusion of gas and air to take place. If flame were to be brought in contact with the contents of the gas and holder shortly after the occurrence of such an accident, which would, of course, happen if the injury to the tank were caused by fire, there would be still no explosion, but burning of the gas from the surface upwards, as in a common lecture-table experiment, where combustible gas, contained in an inverted jar, is ignited at its inferior surface, and extinguishes a lighted taper plunged into its mass. As to the gas holder itself being so much damaged by the action of the heat or flame as to be rendered incapable of containing the gas, such a thing is scarcely possible. It is well-known that rivetted sheet-iron vessels will bear a lengthened exposure to a red heat before they are so much injured as to become leaky; and if, in the case of the gas holder, the sudden action of powerful flame, striking on its exterior, were so to twist and warp the plates, that the gas could escape, there would simply be combustion of the gas as it issued from the openings, as in the case of the perforated gas holder first discussed.

A little consideration of this subject seems to show, then, that the explosion of a gas holder, from circumstances created by the influence of a conflagration in a gas works, is an event, not perhaps beyond the bounds of possibility, but so far removed from anything like probability, that any serious fears in connection with it must be looked upon as entirely groundless. Such an occurrence seems never to have taken place in the whole course of gas-making practice; and if we reflect upon the natural laws which operate in the matter, it is to be presumed that it could scarcely be made to happen under the influence of any external circumstances. It cannot be denied that a conflagration may be increased to a fearful extent by the contents of a gas holder becoming ignited, but it may be safely questioned if, in any case, there is the slightest danger to be apprehended from explosion.

NEW BAROMETER.

The New Standard Barometer, invented by Mr. Symons, is described by him as designed to overcome the practical objections to Gay Lussac's syphon-barometer, which would probably be much more used but for two reasons—the absence of any arrangement for making it effectually portable, and the use of a vernier and scales to both limbs of the syphon, necessitating two observations, which must be added together to obtain a correct reading. The instrument exhibited by Mr. Symons has a simple arrangement for making it portable, and, instead of two verniers, there is a continuous inside brass tube, to be adjusted by a rack to the level of the mercury in the lower limb of the syphon-tube. The barometer is read off by the vernier attached to the top of this internal and moveable tube in the same way as in Fortin's or other standard barometers. No cistern is required, and therefore the instrument is much lighter, simpler, and of course of cheaper construction than Fortin's or other similar barometers, while it appears to possess all the desiderata of a standard barometer, and can be accurately adjusted more quickly than an instrument with an ivory point dipping in the mercurial cistern.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Entomological, 7.
British Architects, 8. Annual Meeting.
Asiatic, 3.
Royal Inst., 2. General Monthly Meeting.
Geologists Association, 7. 1. Mr. J. Rofe, F.G.S., "On some Recent Shells found in Lancashire." 2. Professor Tennant, "Geological Ramble on the Banks of the Medway."
Tues. ...Civil Engineers, 8. Mr. Zerah Colburn, "American Iron Bridges."
Pathological, 8.
Photographic, 8.
Ethnological, 8.
Architectural Museum, South Kensington, 7½. Sir Henry Dryden, Bart., "On Construction and Ornament, Old and New."
Royal Inst., 3. Prof. Tyndall, "On Sound."
Royal Horticultural. Floral Committee, Fruit Committee, 12. Opening of Exhibition of Sculpture, 1.
Wed. ...Society of Arts, 8. Dr. Andrew Wynter, "On Bread Making, particularly with Reference to the Condition of those Employed in its Manufacture."
Geological, 8.
R. Soc. Literature, 8½.
Thurs...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. Mr. John Lubbock, F.R.S., "On two Aquatic Species of *Hymenoptera*."
Chemical, 8. Dr. Lyon Playfair, "On the Constitution of Salts."
Royal Soc. Club, 6.
Artists and Amateurs, 8.
Royal Inst., 3. Prof. Ansted, "On Geology."
Fri. ....Astronomical, 8.
Royal Inst., 8. Prof. Voelcker, "Soils of England."
R. United Service Inst., 3. Capt. C. C. Chesney, R.E., "The Recent Campaigns in Virginia and Maryland."
Royal Botanic, 3¾.
Sat. ....Royal Inst., 3. Professor Max Muller, "On Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

866. T. Burrow, Albert-place, Brighouse, near Normanton—Imp. in, and machinery for, combing and dressing silk, flax, wool, hemp, China grass, and other fibrous materials.
868. M. Henry, 84, Fleet-street—Imp. in probes, catheters, and similar surgical instruments. (A com.)
870. J. Burwin, Keighley, Yorkshire—Imp. in pickers, and in the means or apparatus employed in the manufacture thereof.

Dated 7th April, 1863.

874. A. C. Bamlett, Ripon, Yorkshire—Imp. in reaping and mowing machines.
878. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of baryta and its derivatives, in obtaining by-products, and in revivifying or recovering certain agents employed in such manufacture. (A com.)

Dated 8th April, 1863.

882. G. Hill and W. R. Hill, Bolton—Imp. in steam boilers.

884. J. Mosheimer, Dolgelly, Merionethshire—Certain imp. in machinery or apparatus for crushing, grinding, and dressing metallic, ores, quartz, and other similar substances."
888. W. E. Gedge, 11, Wellington-street, Strand—Imp. in apparatus for propelling and navigating small craft. (A com.)
890. J. L. Norton, Belle Sauvage-yard, Ludgate-hill—Imp. in machinery for washing and drying wool and other fibres and rags, also in tendering, stretching, and drying fabrics.

Dated 9th April, 1863.

892. H. B. Fox, Liverpool—Imp. in dish covers.
902. A. V. Newton, 66, Chancery-lane—An improved construction of offensive weapon. (A com.)
904. A. V. Newton, 66, Chancery-lane—An imp. in stirrups, and in the mode of attaching the same to saddles. (A com.)

Invention with Complete Specification Filed.

906. S. A. Couperie, Bordeaux—A semi-circular metallic slide, whereby the pole bolt is effectually suppressed, and which can be adapted to every four-wheeled vehicle.—10th April, 1863.

[*From Gazette, April 24th*, 1863.]

Dated 22nd December, 1862.

3414. A. S. Stocker, Wolverhampton—Imp. in rolling iron for the manufacture of tips and other articles.

Dated 15th January, 1863.

127. H. Turner, Leeds—Imp. in apparatus for preventing and curing blight, decay, disease, and rot in potatoes.

Dated 18th February, 1863.

450. J. Gray and J. Hudson, Botolph-lane—Imp. in the treatment of steatite, and in its application to certain purposes.

Dated 24th February, 1863.

496. H. Masters, Bristol—Imp. in spools, bobbins, rollers, and similar articles.

Dated 3rd March, 1863.

601. J. Pollard, Leeds—Imp. in warp dressing, and in apparatus connected therewith. (A com.)

Dated 5th March, 1863.

622. W. Jackson and R. Watkins, Millwall, Poplar—Imp. in steam engines.

Dated 6th March, 1863.

637. W. E. Gedge, 11, Wellington-street, Strand—Imp. in steam engines. (A com.)

Dated 11th March, 1863.

667. W. Wood, Monkhill, near Pontefract—Imp. in the manufacture and ornamentation of pomfret or liquorice cakes, rolls, sticks, and pipes, and other similar articles of confectionery.

Dated 21st March, 1863.

753. I. M. Evans, Cefn Mawr, Denbigh, and W. T. Griffiths, Merthyr Tydvil—Improved means for ventilating mines.

Dated 7th April, 1863.

872. J. Swinburne, Alfred Town, Ashford, Kent, and J. Stanley, Whitechapel-road—Imp. in steamengines and generators.
876. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for drying grain, applicable also to the manufacture of malt. (A com.)
880. J. Howard, E. T. Bousfield, and J. Pinney, Bedford—Imp. in steam engines, and in the means of applying the same to the tilling of land, also in apparatus to be used with such engines in the tilling of land.

Dated 9th April, 1863.

896. G. Spencer, 2, Lousanne-villas, Queen's-road, Peckham, Surrey—Imp. in preventing incrustation in steam-engine boilers.
900. Vice-Admiral J. R. Burton, K.H.A., 15, Park-square, Regent's-park—A new method of and apparatus for cleansing ships' bottoms.

Dated 10th April, 1863.

908. S. Shelmerdine, Stockport, and J. Dransfield, Oldham—Imp. in the ornamentation by printing of felt hats.
912. J. Gimson, Leicester—Imp. in screw-cutting lathes.
914. H. Caudwell, Oatlands-house, Shillingford, Oxfordshire—Imp. in the construction of vessels of war, part of which imp. is applicable to fortifications.

Dated 11th April, 1863.

916. J. Lockwood, Batley, Yorkshire—Imp. in steam boiler and other furnaces.
918. W. Samuel, Liverpool—Imp. in or applicable to railway carriages to mitigate or lessen the effects of collision to passengers.
920. W. Clark, 53, Chancery-lane—Imp. in separating ores from their gangues, and in apparatus for the same. (A com.)
922. A. F. Maclure, Glasgow—Imp. in looms for weaving figured fabrics.

Dated 13th April, 1863.

924. J. Ramsbottom, Crewe, Cheshire—Imp. in machinery for hammering, rolling, and shaping metals.
926. A. Rolfe, Amwell-street, Pentonville—Imp. in means or apparatus for propelling carriages on railways, tramways, or on common roads.
932. T. Mallinson and P. Williams, Manchester—Imp. in machinery for opening, cleaning, carding, and grinding or sharpening cards used in preparing cotton and other fibrous materials.

Dated 14th April, 1863.

934. G. Berry, 19, Bulteslaad-street, Hoxton—Imp. in locks.
936. W. Keats and J. Keats, Street, Somerset—Imp. in the manufacture of boots, shoes, or other coverings for the feet.
938. J. Keats and W. S. Clark, Street, Somerset—Imp. in sewing machines.
942. J. Smith, Edward-street, Wentworth-road, Bow-road-east—Imp. in furnaces and boilers for the generation of steam, partly applicable also for other purposes.

Patents Sealed.

[*From Gazette, April 24th*, 1863.]

April 24th.

2865. L. Groux.
2889. T. Pilgrim.
2891. J. J. Ridge.
2892. P. E. Placet.
2893. G. Lindemann.
2898. E. Hooper.
2900. E. Tatham & A. Tatham.
2903. E. S. Tudor.
2906. T. Sutton.
2907. A. Ripley.
2908. A. Shanks and F. Kohn.
2918. W. E. Gedge.
2922. F. L. Stott.
2926. H. Eastwood.
2927. F. Gregory.
2931. P. Giffard.
2940. D. Spink.
2955. J. W. Taylor.
2962. F. Tussaud.
2966. F. Trachsel and T. Clayton.
2970. T. O. Clark.
2985. J. Shirt.
3001. J. J. Laveissiere.
3010. C. O. Heyl.
3021. E. Sonstadt.
3029. R. R. Holmes.
3049. J. Faulding.
3055. G. W. Rendel.
2065. C. G. Kopisch.
3075. E. Kirby.
267. J. Pouncy.
395. J. A. Schlumberger.
516. H. Wilde.

[*From Gazette, April 28th*, 1863.]

April 28th.

2942. C. Gubbins.
2969. W. Clark.
2971. D. Scattergood.
2973. R. A. Brooman.
2974. W. H. Stallard.
2976. J. Lefebvre.
2977. F. Durand.
2982. P. W. Reuter.
2983. T. Huntley.
2984. R. A. Brooman.
2988. A. Wall.
2998. J. Petrie, jun., and J. Teal.
3008. J. A. Fullarton.
3013. T. Greenwood and J. Schofield.
3016. H. Kilshaw and E. Lord.
3023. J. Mellodew, T. Mellodew, and C. W. Kesselmeyer.
3028. S. Berrisford and W. Ainsworth.
3047. T. Bradford.
3051. J. A. Duntze.
3074. L. Croc.
3102. J. Oxley.
3104. H. J. F. Marmet.
3113. G. A. Buchhholz.
3143. C. De Bergue.
3165. A. V. Newton.
3241. A. T. Becks.
3314. W. A. Turner.
92. D. Dawson.
162. R. A. Brooman.
184. A. Boubee.
263. T. A. Weston.
411. F. E. Walker.
482. A. Dugdale.
579. J. W. Burton.
678. E. H. Lomas.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, April 28th*, 1863.]

April 21st.

1008. J. Parkinson.

April 23rd.

1017. E. Hillam & R. R. Witlon.
1033. T. A. Claeys.
1042. J. G. West.

April 24th.

1056. W. J. Harvey.
1089. H. T. Green and S. B. Wright.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, April 28th*, 1863.]

April 22nd.

1211. C. De Jongh.

April 24th.

997. R. Lakin, J. Thompson, E. G. Fitton, & F. A. Fitton.
1003. C. A. Arnaud.
1026. T. Heiffor.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4549	April 16.	Flexible Bottle	Alfred Warn Banks	67, Newgate-street, E.C.
4550	,, ,,	The Albert Edward Scarf	W. Bacon and Thos. Hawley	7, King-street, Coventry.
4551	,, 23.	Prince of Wales Waterproof Shooting Boots	Samuel Baker	48, Lombard street, E.C.
4552	,, 27.	Scarf Fastener	Ebenezer Banes	85, Newgate-street, E.C.
4553	,, ,,	Boot or Shoe Warmer	Henry Doulton and Co.	63, High-street, Lambeth.
4554	,, 29.	The Alexandra Jelly Mould	Benham and Froud	40, Chandos-street, W.C.

Journal of the Society of Arts.

FRIDAY, MAY 8, 1863.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following additional names have been received up to the 7th inst.:—

Beveridge, Erskine	£1	1	0
Gordon, J. W.	1	0	0
Hall, Ralph	1	1	0
Langton, W. H. Gore, M.P.	1	1	0
Nash, Eliezer	1	1	0
Peake, Thomas	1	1	0
Sewell, Charles Brodie, M.D.	1	1	0
Talbot de Malahide, Lord	1	1	0
Telford, Charles	1	1	0
Virtue, James S.	1	1	0
Wetter, Conrad	1	1	0
Whitaker, Joseph	1	1	0
Whitaker, William	1	1	0
Wyatt, Matthew Digby	1	1	0

DWELLINGS FOR THE WORKING CLASSES.

With a view to promote enlarged investments of capital in model dwellings and other establishments for the benefit of the working classes, the Council of the Society of Arts has instituted a statistical inquiry into the results hitherto obtained, including family dwellings of every description, model lodging-houses, dormitories, refuges, baths and washhouses, soup kitchens, coffee-houses, &c.

Members and others who can supply information or indicate sources where it may be obtained, are requested to communicate with the Secretary, who will send blank forms for being filled up with the required data.

PRIZES TO ART-WORKMEN FOR ART-WORKMANSHIP.

The following notice has been issued by order of the Council* :—

I. The Council of the Society of Arts hereby offer prizes to Art-workmen for the successful rendering of the undermentioned designs in the undermentioned processes of manufacture, according to the directions detailed in each case.

II. Such designs will be by artists of great reputation, to be translated into the various modes of workmanship, and photographs and castings of such designs will be sold by the Society, at the Society's House, at cost price, to persons desiring to be competitors. The prices of the photographs and castings are stated after each subject.

III. The works to be executed will be considered to be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

IV. The exhibitors are required to state in each case the prices at which their works may be sold, or if sold previously to exhibition, at what price they would be willing to produce a copy.

V. The awards in each class will be of two grades, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the award; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

VI. The prizes will be presented publicly. Before the award is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

1. Modelling in Terra Cotta, Plaster, or Wax.

(*a.*) *The Human Figure in bas-relief.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's design of the "Three Graces."* Dimensions—The figures are to be 9 inches high.

[Photograph—One shilling.]

(*b.*) *Ornament in bas-relief.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas van Leyden, 1528. Dimensions, 12 inches by 6 inches.

[Photograph—Sixpence.]

2. Repoussé Work in any Metal.

(*a.*) *The Human Figure as a bas-relief.*—A prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's "Three Graces."* Dimensions—The figures are to be four inches.

[Photograph—One shilling.]

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a Flemish salver in the South Kensington Museum, date about 1670, No. 1153. Dimensions—Ten inches in diameter.

[Photograph—One shilling.]

3. Hammered Work, in Iron, Brass, or Copper.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after an iron German arabesque, about 1520, in the South Kensington Museum, No. 2450. Dimensions—12 inches by 1½ inch.

[Photograph—One shilling and threepence.]

4. Carving in Ivory.

The Human Figure in bas relief.—One prize of £10 for the best and a second prize of £5 for the next best, work executed after a Terra Cotta ascribed to Luca della Robbia, about 1420, in the South Kensington Museum, No. 7610. Dimensions—The plaque to be four inches high.

[Photograph—One shilling.]

5. Chasing in Metal.

(*a.*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after a reduced copy of *Gibson's "Psyche."*

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society, price, 12s. A plaster cast may be obtained from D. Brucciani, 39, Russell-street, Covent-garden, W.C., price, 3s. 6d.

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a bronze plaque in the South Kensington Museum, No. 1217.

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society, price 1s.

6. Enamel Painting on Metal, Copper, or Gold.

(*a.*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed

* Copies may be had on application to the *Secretary*.

after *Rafaelle's design of the "Three Graces,"* executed in *grisaille*. Dimensions—The figures are to be four inches high.

[Photograph—One shilling.]

(*b*.) *Ornament in grisaille.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a German arabesque (16th century). Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

7. PAINTING ON PORCELAIN.

(*a*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's "Boy bearing Doves,"* in the cartoon of the "*Beautiful Gate.*" Dimensions, the same as the Photograph. This work is to be coloured according to the taste of the painter.

[Photograph—Ninepence.]

(*b*.) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, 1528, and coloured according to the taste of the painter. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

8. INLAYS IN WOOD (MARQUETRY, OR BUHL), IVORY OR METAL.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a majolica plate in the South Kensington Museum, 1490, No. 1671. Dimensions—The same as the Photograph.

[Photograph,—One shilling and threepence.]

9. ENGRAVING ON GLASS.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, 1528, engraved the height of the photograph; and if round a glass or goblet, repeated so as to be not less than 9 inches long when stretched out.

[Photograph—Sixpence.]

10. EMBROIDERY.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a German example in the Green Vaults at Dresden. Dimensions, according to the taste of the embroiderer.

[Photograph—Sixpence.]

VII. The Council cannot hold itself responsible for any accidents or damages of any kind, occurring at any time.

VIII. Persons intending to compete should give notice, in their own names or by cypher, to the Secretary of the Society of Arts, John-street, Adelphi, W.C., on or before the 15th July, 1863.

IX. Each work must be marked with the name of the Art-workman, or, if preferred, with a cypher, accompanied by a sealed envelope, giving the name and address of the Art-workman, and delivered free of all charges, at the Society of Arts' House, John street, Adelphi, London, W.C., on or before the 31st August, 1863.

COMMITTEES OF REFERENCE.

MANUFACTURES.

The Committee on Manufactures met on Friday, the 1st May, Sir Thomas Phillips, chairman of the council, in the chair.

The CHAIRMAN explained the objects of the committee and invited suggestions from members present, both as to subjects for which the council might usefully offer rewards, and in reference to which investigations might advantageously be entered into.

Mr. THOMAS C. CLARKSON wished to see some means provided whereby inventions which clashed with existing interests might be brought before the public in a practical shape. He mentioned the difficulties inventors had to encounter from the prejudices and opposition of persons whose interests were affected by particular inventions or applications of materials to manufactures. He had been battling with those prejudices and difficulties for many years in his own case with regard to an application of materials as a substitute for leather.

Mr. BRABY suggested that the difficulty mentioned by Mr. Clarkson, with regard to introducing inventions to the public, might be met by the appointment by the Society of a Committee to examine into inventions brought before them, who, after careful investigation, might give such recommendations as they thought them deserving of, and an invention would then go forth as having received the approbation of such a committee. He thought such a proceeding would have a similar effect to a medal awarded at an exhibition.

The CHAIRMAN said he should be glad to hear the opinions of the Committee upon the practical suggestion of Mr. Braby for the appointment of a body of experts, who in such cases as the one brought before them by Mr. Clarkson might report upon the merits of inventions.

Mr. LATHAM thought the opinion of a jury of experts would be of little value without a full experimental investigation of each invention.

Mr. S. REDGRAVE did not think a jury of experts would be of value. Such a body would find themselves involved in a work of considerable labour and difficulty, which he thought would be more than commensurate with the results that would be obtained.

Mr. P. L. SIMMONDS thought the subject introduced by Mr. Clarkson was one of considerable importance. At the present time leather was scarce in the market; the supply was by no means adequate to the demand, and any practical substitute for that article was deserving of consideration. The Japanese imitation leather at the last Exhibition attracted great notice, and it would be worth while to investigate how far such a substance could be practically employed as a substitute for real leather in certain cases.

Mr. LAVANCHY, reverting to the suggestion of Mr. Braby, thought they were hardly in a position to express an opinion upon it. In some instances it might, he thought, lead to injustice being done to inventions, whilst in other cases certificates might be given which upon more mature consideration would be found to be unmerited. With regard to the public utility of an invention, such a jury might be willing to express an opinion; but, looked upon in the light of an advertisement for the benefit of one individual only, he thought it would be objectionable.

Mr. WINKWORTH remarked that they already possessed a tribunal which was free from the objection alluded to by Mr. Lavanchy. Papers were read in that room from time to time, and the subjects treated of were openly discussed. By that means any particular invention or application of materials obtained a publicity which it would not otherwise have. He thought a committee, which would to a certain extent be a jury of experts, would hesitate before expressing such an opinion as would be of value either to the persons bringing inventions before them or to the public at large.

The CHAIRMAN said the discussions in that room upon the matters brought before the members from time to time amounted to nothing more than the expression of the opinions of the several speakers. In such a case as that which Mr. Clarkson had mentioned, nothing short of a jury of experts could express such an opinion of his invention as he was desirous of having.

Mr. BRABY remarked that the range of manufactures was so immense, that a special committee, to decide upon the merits of inventions and applications of materials, might acquire more importance than was desirable. At the same time, it was to be remembered that one of the main objects of this Society was the encouragement of manufactures, and he thought some such means as he had suggested might be useful for that end, in addition to the reading of papers before the Society. Mr. Lavanchy appeared to take an objection to his suggestion on the ground that it would be unduly forwarding individual interests, whereas all useful inventions were for the public benefit. He thought that jealousies on the part of inventors might be avoided by having but one order of merit, and any invention not deemed worthy of that distinction could be passed over, and the world would know nothing of its rejection. He still thought a committee of carefully-selected men would be an excellent means of introducing a meritorious invention to public notice, and inventors themselves would attach value to the testimonial of such a committee.

The CHAIRMAN might say that to a limited extent this Society had undertaken that duty. Whenever an inventor asked the Council to appoint a committee to consider any particular invention, if they deemed the matter of sufficient importance they referred it to a committee of experts, and if that committee found that it possessed substantial merits, they recommended the Council to award the Society's medal for it. This had been done in various instances.

Mr. WINKWORTH said the result of his experience as a juror on textile fabrics on two occasions was a conviction in his own mind that whilst it was hopeless to attempt to give satisfaction generally to competitors, yet, at the same time, nothing was more likely to bring out latent talent than unfettered competition. During the time that the annual Exhibition of Inventions were held in the Society's house, there was a difficulty in getting really important inventions exhibited there, because the manufacturers could sell as many of the articles as they could make without the trouble of exhibiting them, therefore the suggestion was made that they should have international exhibitions, the result of which they all knew. He could unhesitatingly assert that in his own department (silk) there never was a better English display than was produced at the last Exhibition. On the first occasion the French received more credit than they really deserved, but that arose from their manufacturers having exhibited a large quantity of goods and specimens which were the accumulation of years, his friend M. Arlès Dufour having recommended the Chamber of Commerce of Lyons to purchase for the purpose of exhibiting. The inquiry now before them was whether, by annual exhibitions of national productions, or by any other means, they could promote the interests of manufactures. He thought those exhibitions were most valuable, as they afforded opportunities of ascertaining how far each nation possessed within itself the means of adapting valuable discoveries in manufactures for the benefit of the community at large as well as of the producer. It would, however, scarcely be right to wait for periods of ten years—(supposing another exhibition to be held)—before inventions and improvements were brought forward, and therefore such a committee as that which Mr. Braby had suggested might be of advantage in assessing the merits of particular inventions.

Mr. J. J. EAMONSON thought the Society might do more good in this direction than it had hitherto done. The present Committee was only now feeling its way, and he anticipated that it would meet on many occasions to exchange opinions for their mutual benefit. The two great exhibitions which had taken place in this country had been most useful, although there were some who thought these exhibitions did them more harm than good. His impression was that the exhibition should be annual, and he recommended that the Society should hold annual exhibitions of the articles made by the producers themselves. [Mr. WINKWORTH — National, or international?] He would leave that for future consideration. His own opinion was, that the producers of our own country only needed proper information and encouragement to enable them to show what they could do. It was well known that the capitalist was dependent upon the humble working producer. A large amount of the articles sold were produced by the mechanic in his small workshop. This was the case at Birmingham and Sheffield. The factor had not the time, and, perhaps, not the ability, to enter into the question whether the articles he dealt in were constructed in fine artistic proportions. It was sufficient for his purpose that a saleable article was produced. In manufactures they had to deplore, in many descriptions of goods, the entire absence of proper artistic proportions and the suitable adaptation of ornament. Under the existing system of education and training of our artizans he did not see how this could be otherwise. The youth who was to be the future producer was apprenticed to a trade at an early age, with little or no previous education, and had to learn his business without any tuition as regarded art or finish beyond what was necessary to gain him a living by his labour. If the Society instituted exhibitions of articles shown direct by producers, and offered prizes like those which were to be given for wood-carving, metal-working, and other branches of trade, he thought it would do a great deal of good.

Mr. LAVANCHY said for years past the tendency in this country had been to produce goods at greatly reduced prices; but, at the same time, the public was scarcely aware that inferior materials were necessarily used, and thus the goods would not bear comparison with those of other nations. But when they employed the same quality of raw material they were fully equal to the productions of other countries. In the last Exhibition his friend Mr. Winkworth would bear him out that there was great doubt in the minds of the jurors as to the comparative merits of the textile manufactures. He alluded particularly to silks, for never had England covered herself with more glory in her manufactures than in the silk department of the late Exhibition. That was owing to adopting the principle of using the same quality of raw material as their foreign competitors. In France of late, and also in Italy, the manufacturers were adopting cheap materials, as had been done in England. At Lyons, by means of a superior mode of throwing silks, an article which was formerly considered unfit for wear was now brought very largely into practical use, and used, too, with great effect in point of price; and goods were made in France at the present time which would rival in cheapness anything produced in this country. Then, again, in the article of shawls, England came out with great glory at the last Exhibition. No nation could make a finer display. He was not favourable to annual exhibitions, inasmuch as they would be very expensive to the exhibitors. There was to be an Exhibition of all nations, in 1865, in Vienna, in which he trusted England would stand in the same position as she had done in that of last year.

Mr. WINKWORTH thought in the present age of rapid progress a great deal was to be said in favour of more frequent exhibitions, although perhaps upon a smaller and less expensive scale. In such cases of course there must be considerable limitation of room, and he apprehended machinery would be out of the question, but as regarded manufactures he thought it a subject worth consideration.

Mr. JOHN BELL said, as to annual exhibitions it occurred to him that an extension of the idea which had prompted the art workmanship prizes might be good; and that it might be desirable that what had been proposed for wood carving, &c., should be extended to many other branches of manufactures, and exhibitions of such a limited nature might be frequently held; but as to annual international exhibitions on a large scale, he doubted if that would be a wholesome thing. He thought it would be impossible to get manufacturers to come forward so frequently. The larger manufacturers were stimulated to send their pro-

ductions to the periodical international exhibitions in defence of their own position, but he believed the majority of them were not favourable to the idea. He was strongly in favour of these great exhibitions being held in different countries, rather than having them too frequently in England. With regard to annual exhibitions of the productions of working men, and the giving of prizes within certain limits, he was strongly in favour of such a proposition.

The Chairman said he would remind the meeting that the Society had contributed to the prize fund formed by the Painters' Stainers' Company for award amongst workmen, and that company had held in their Hall an exhibition of the works produced. The Society had this year determined to give similar encouragement to wood carvers, and it had also offered a number of prizes in various other departments of manufactures. He saw no reason why the principle should not be extended to other branches. While they prided themselves upon the progress of the present age, and spoke in self-laudation of what was done by their immediate progenitors, any one who visited the exhibition of the works of former ages, at the South Kensington Museum, must be struck with the beauty and skill displayed in the articles exhibited there. The object at the present time was to multiply, for the benefit of the masses, those articles of beauty which our forefathers could only bring within the reach of the rich and the great. With regard to the present meeting, it must be understood that it was only for the purpose of making a commencement; and whenever any member of the committee had suggestions which he thought were likely to promote the object they had in view, the Committee could be called together to discuss them, and some practical action might be taken upon them by the Council.

Mr. Eamonson stated that he was not at the moment prepared with any suggestions for the extension of the premiums of the Society to other branches of manufacture than had been mentioned in the list sent out.

Mr. Nash called attention to what he considered was a want in the branch of industry with which he was personally connected, viz., working in the precious metals. There was no means, he said, of collecting practical information and facts in connection with that manufacture in such a way that they could be diffused for the benefit of the workmen, to whom they would be of the greatest value. He adverted to the system pursued in apprenticeships, and especially in the Goldsmiths' Company, viz., that the apprentice was bound to follow implicitly the teaching of his master, and "all his secrets keep." The keeping of those secrets had been of the greatest possible injury to the trade and to the public.

After a conversation, in which several members of the Committee expressed their opinion that there would be little chance of inducing manufacturers to divulge valuable trade secrets for the benefit of the community at large, the meeting separated.

TWENTY-FIRST ORDINARY MEETING.

Wednesday, May 6, 1863.

The Twenty-first Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 6th inst., John Dillon, Esq., Vice-President of the Society, in the chair.

The following candidates were proposed for election as members of the Society :—

Alexander, Rev. D. M. ...	Oldham.
Astles, Frederick W.	The Laurels, Smethwick, near Birmingham.
Cardwell, Thomas.........	8, Up. Hyde-park gardens, W.
Dean, Alfred William ...	32, Queen's-road, Regent's-park, N.W.
Dickson, J.	66, Tollington-road, Holloway, N.
Dorling, Henry	62, Warwick-square, Pimlico, S.W.
Tucker, B. R.	3, Albert-terrace, Charlton, Dover.

And as Honorary Corresponding Member,

Lombard, Edouard Auguste, Genève.

The following Candidates were balloted for and duly elected members of the Society :—

Baxter, Richard	14, Porchester-square, W.
Cook, Dutton	4, Raymond-buildings, Gray's-inn, W.C.
Costa, Michael	54, Eccleston-square, S.W.
Cox, Edward	102, Chancery-lane, W.C.
Davidson, Septimus	22, Basinghall-street, E.C.
Dean, Samuel...............	5, Cleveland-gardens, Hyde-park, W.
Denison, Alfred	6, Albemarle-street, W.
Dicker, John Campbell...	10, Craig's-court, Charing-cross, S.W.
Harwood, H. Harwood ...	29, Cleveland-square, Hyde-park, W.
Hayes, George, M.D.......	63, Conduit-street, Bond-street, W.
Lake, George Walter Gidley..........................	13, Finsbury-place South, E.C.

The Paper read was—

NATAL AND SOUTH-EAST AFRICA.

By John Robinson, of Natal.

Discovery.

Nearly four centuries ago, on the 25th December, in the year 1497, the small exploring squadron of the Portuguese navigator, Vasco di Gama, having rounded the Cape of Good Hope about a month before, hove in sight of a shore wonderfully different in its soft outlines from the rugged cape eight hundred miles behind them. The coast which these old mariners had now for the first time discovered, presented to their delighted eyes a pleasant succession of green hill-slopes, whose luxuriant vegetation skirted even the ocean's edge; of bush-clad valleys bearing seaward the waters of many ever-flowing rivers; of lofty hills, table-topped or chasm-cleft, bounding the far inland horizon; of great jungle forests, varied by the strange forms and foliage of the euphorbium, the cactus, or the native palm, while over all stretched a bright and genial sky, bespeaking the existence of that happy mean of climate which is possessed by all the lands that lie just beyond the Southern tropic. In honour of the day, this attractive region was named by its discoverers Terra Natalis, and to this day it bears the Anglicised version of that happy designation. It is of this land—of Natal—that I now have to speak.

Situation.

The British colony of Natal occupies the same parallel of latitude as Algeria, Queensland, Chili, and other countries similarly situated as regards fertility of soil and variety of resources. It is thirty degrees east of Greenwich, and thirty degrees south of the line, and has at present a seaboard of about 150 miles, overlooking the Indian Ocean at a point of the African continent about 800 miles north-eastward of the Cape. Being 390 miles south of the tropics, we are free from those protracted seasons of intense heat that are incidental to torrid latitudes, while we also enjoy an immunity from the inconveniences and the evils of a low temperature. The climate of Natal is, on the whole, well worthy of its reputation. Mild and congenial, it is neither too inclement nor too relaxing for the European system. The thermometer indicates a range of temperature from 38 to 96 degrees. The

monthly mean during the winter season, from May to August, would range according to locality 60 to 67 deg. This period of the year is characterised by a clear bright sky, by a rainless atmosphere, by a keen bracing temperature before sunrise and after sunset, and by moderate warmth during the day. The summer, or the "rainy season," may be said to last from October to March. At this time, especially in the month of February, the heat is much greater. Occasionally the thermometer will rise to 100 deg. in the shade, and very rarely indeed falls below 60, while it often ranges between 80 and 90. As a rule, the district near the shore is warmer than the uplands. During the summer of 1858-9 the mean temperature of the latter was 69·4 deg., but on the coastlands it was 74 deg. Periods of extreme heat are not of long duration. On the shore a sea-breeze generally springs up after noontime, and renders the air pleasant. The English constitution does not find the colonial climate inconvenient or injurious. On the contrary, Natalian residents invariably complain of the bitterness of a northern atmosphere, on revisiting the mother country after an experience of several years on the coast of South Eastern Africa.

CLIMATE.

Although the area of the colony, properly so-called, does not, as yet, exceed that of Scotland, it is, owing to the peculiarity of its physical conformation, endowed with the climates and the capabilities of many countries that are widely divergent in their topographical relations. The surface of the land rises from the sea-shore to the western boundary of the colony—formed by the Great Drakenberg, or Kahlamba range of mountains—in a series of terrace-like elevations. Thus, although the town of Pietermaritzburg is only fifty miles from the coast, and does not appear to occupy a special altitude, it yet is 2,000 feet above the sea-level. This height is attained by low hill ranges which present a bold face seaward, but which have no corresponding descent on the landward side. In this way the surface gradually ascends until it reaches the limits of the colony, where its height above the level of the sea has increased to nearly 5,000 feet. It will thus be understood why it is that the atmosphere of the shore-belt is more humid than that of the remoter districts, and why in the uplands the temperature of a much lower latitude is not frequently experienced during the winter. It is necessary to state this interesting fact at the outset, as it sufficiently accounts for the unusually comprehensive range of Natal's natural products, and justifies the colonists in looking forward to rapid progress and steady prosperity in the future.

Pleasant as the dry mid-year months may be, the colonists rejoice when the heats of summer arrive, accompanied as they are by periodical rains. After April very little rain falls until October, when the spring showers are anticipated. As a general rule, wet weather never lasts longer than one or two days. On very rare occasions a south-east wind sets in from seaward and brings with it a fall of rain, extending, perhaps, over three or four days. After this exceptional occurrence the rivers will be more or less flooded, and some inconvenience may ensue. Thunder-storms are very common during the hotter months. These electrical visitations usually take place in the evening, and though severe for the time being, soon pass away, after having effectually achieved their work of purifying and relieving the atmosphere.

Dr. Mann, in the Chapter on "Climate," which he incorporated in his compiled Guide Book, has given some interesting results of local observations made by himself. During the six summer months of the year 1858-9, he noticed "eighty days on which rain fell in the neighbourhood of Maritzburg, the entire fall for the period amounting to twenty-one inches and six hundreds," giving an allowance for each day of the six months, of "rather more than a tenth of an inch." For five winter months he computed the daily allowance of rain to be nine thousandths of an inch. These observations were made 54 miles from the coast, where, during the same period, nearly 33 inches was the aggregate of the summer rain-fall.

The other climatal peculiarities which may be briefly noticed, are the occurrence a few times during the year of sirocco-like "hot winds," which blow over the upland and midland districts, from the north-west, and are presumed to have originated in the far western deserts. These warm blasts are excessively disagreeable to the senses, but happily they vanish shortly after midday, and are hardly ever experienced near the coast. Heavy hail or ice-storms sometimes fall, and if they chance to visit a town or valley, may prove destructive to wall plaster, fruit trees, and windows.

As regards the sanitary properties of the climate, it may be distinctly stated that few parts of the world are or can be healthier. Free from any epidemic disease incidental to the country; free, also, from any of those meteorological extremes which are so injurious to the constitution and so unpleasant to the sense—marked by peculiarities which are mostly the means of counteracting some more prejudicial tendency—the climate of Natal is no less congenial than salubrious. It has of course certain conditions of temperature that necessitate the exercise of habitual caution in certain special respects. Sudden alternations from heat to cold; local humidity in particular localities on the coast; heavy dews, or possible malaria, may produce or promote disease in systems which have not guarded themselves from the effects of such influences; but beyond a tendency to dysentery and the occasional prevalence of a sort of low fever, there is in this part of South-Eastern Africa no class of disease partaking either of an epidemic or an endemic type.

HISTORY.

It is impossible, in justice to more important branches of the subject, to enlarge upon the history of the colony. Short though that history is—and little known as may be the country—it records many vicissitudes. After its casual discovery by the Portuguese navigators, the Natalian territory passed for a long period into obscurity. What, during these years, were its features; who were its inhabitants; what their customs, character, or origin—no written record informs us. Two centuries later the curtain is again lifted, and we have fuller information respecting the strange African shore, quaintly supplied us by English and Dutch mariners, some of whom had been shipwrecked there, and some sent on a tour of exploration by the Government of the Cape Colony. The log books of these old sailors have been preserved amongst the local archives, and contain a mass of most valuable and interesting facts. Debarred from the pleasure of quotation, I may simply state that there is greater importance and significance in the historical testimony thus accidentally furnished, because the lapse of 200 years has failed to invalidate it, or to belie any of the impressions there so truthfully formed and so minutely told. What Natal and its natives *then* were, they, in most of their natural aspects, are *now*.

With the exception of an unsuccessful attempt made by the Dutch to found a trading settlement there in 1721, nothing more is heard of Natal until 1823, when Lieut. Farewell formed a small band of colonists, who proceeded to the port now called Durban, and established a settlement there. This was simply a private venture, as the British government declined to take any part in the enterprise. These adventurers underwent many vicissitudes, and gathered around them a considerable band of aboriginal followers. They had to propitiate the favour of the great Zulu chieftain Chaka, whose reputation as a warrior and a conqueror was such that, to swear by his bones, is the most binding form of oath current among the natives. A gradual influx of refugees from the rapacity of their own rulers began, and this has been going on so rapidly ever since, that there is now a coloured population within the colony numbering nearly 200,000 souls. In

1835, the English settlers near the port had increased in number, although the original founders of the infant colony had all been removed either by death or departure; an American mission had been formed, and an English mission attempted, and, shortly afterwards, the emigration of the Dutch boers, from the Cape Colony, set into the newly-developed land. Time forbids my glancing at the events which resulted in the struggle between these latter occupants and the British government. It is enough to state that in the year 1843, the territory of Natal was annexed to the Crown, as a dependency of the Cape Colony, and a corresponding reflux into the interior of a great proportion of the Dutch farmers immediately followed. Since that time the colony has gradually advanced in the path of progress. Peace has happily been maintained, and social order preserved. In 1856, the dependency was constituted a separate and independent colony, by royal charter, which also conferred upon the colonists the privileges of self-legislation, by the establishment of an elective legislative council. Such are the main features of our colonial history.

Physical Features.

From the ravines of the Drakenberg mountains there flow the feeders of several minor streams, which, after intersecting and watering the greater part of our Natalian uplands, amalgamate their waters about sixty miles from the coast, and thence flow down to the ocean as a broad and rapid river, known as the Tugela. This stream, together with its most northerly tributary, forms the northern boundary of Natal. About 150 miles further south, the colony is again limited by another river of less importance, called the Umzimkulu. Between these points, about twenty-four smaller rivers debouch into the sea, bearing with them the contributions of the rivulets and streams which traverse the surface of the land in every direction. Natal, therefore, in no shape partakes of the arid character that nature has stamped upon the western portion of this continent. On the contrary, its contour is undulating; its vegetation is luxuriant; and the valleys which everywhere corrugate its surface are each the channel of running water. Unfortunately, none of these rivers are navigable for any distance from their embouchures. Their rapid descent from the higher ground, and the shallowness of most of them, completely prevent their being employed for purposes of traffic.

The coastlands of Natal are thickly wooded. It is not here, however, that the timber forests of the colony are found. The scenery of this shore belt is delightfully varied and picturesque. Its hills are darkened or mottled by the prevalent jungle bush, which, with its twisted and gnarled trees, its dense, evergreen, bright-leaved undergrowth, its massy flowering parasites, its curious ferns, its insect hosts, and winged multitudes, is a source of peculiar interest and attraction. Many of these bush plants are leguminous, and bear papilionaceous flowers. Although for the most part the larger trees found on the coast are too twisted, hollow, or narrow to be widely available for plank timber, yet they are all useful for certain specific purposes. The "Umsimbiti," or iron-wood tree, whose stem is sometimes eighteen inches wide, affords a very heavy and compact wood, used for axles, and other purposes requiring great strength. There are many other woods found upon the coast, of especial value to the waggonmaker, and which may very probably be found valuable hereafter by the boatbuilder or the cabinetmaker. Several trees occur whose strange forms or peculiar qualities are new to the European eye. The prickly pear, the wild banana (*Strelitzia alba*) with its palm-like crest; the euphorbias, in their multifarious forms, from diminutive plants to solemn candelabra-like trees forty feet high, and perhaps more; the grotesque cacti, which cling to the sides of river cliffs, and gigantic specimens of the aloe, twelve feet in height, are only a few of the vegetable novelties abounding in this region. There are also wild bushes which bear edible fruits; the *Amatungulu*, or native plum; (*Vinca*) the Cape gooseberry; (*Solanaceæ*) the raw apple; (*Diospyrus*) a sort of wild cherry, and varieties of wild raspberry, are among the most prominent.

In certain localities of the uplands fine timber-yielding trees are formed. My limits only allow the enumeration of the more important. The yellow wood, a variety of yew (*Taxus elongata*), being a soft compact wood, is commonly employed throughout the colony for every purpose which does not entail exposure. The tree attains very large proportions, and has mostly a bare stem. Sneezewood and stinkwood are both long-fibred tenacious woods, of good service to the cabinetmaker, and there are two species of ironwoods extremely close-grained and dark-hued. In addition to these there are many other descriptions, such as the red and white milk woods, the white pear woods, the red ivory wood, and other varieties comparatively unknown as yet. The mimosa tribe is found in every part of the colony and in many species. Its wide-spreading branches cover considerable tracts, but so far, the tree has only been employed as fuel. Its bark is much in favour amongst tanners, and this may very possibly become a valuable export. In the International Exhibition about 150 specimens of the timber afforded by the Natalian forests were exhibited, but owing to their small size only an inadequate idea could be formed from them of the real character and properties of our indigenous woods. Slight doubt is there that in most of these new and little known trees we have the means of improving and amplifying the timber supply of the world, and providing particular branches of industry with a better material than is possessed at present. For cabinetwork, vehicle making, and shipbuilding, our colonial woods undoubtedly present special advantages. Medicinal plants and shrubs are numerous, but this is a department of botanical research wholly undeveloped. It is known that strychnine, senna, sarsaparilla, and castor-oil are yielded by certain trees or bushes; it is known that the natives are cunning herbalists, and make good use of the treasure of the fields and forests around them, but no investigation has ascertained, and no classification defined, the extent or the nature of those treasures.

Beyond the coast belt of woodland the country opens out in wide, rolling undulations, sometimes swelling into massive grass-clad hills, sometimes broken by bands of rugged, precipitous, and shattered declivities, and sometimes sinking into gentle basins or valleys. There are the pasture lands of the colony. Except in the valleys and certain marked localities these uplands are covered by two varieties of grass, consisting either of a long, rank, and wiry variety of grass, or of much shorter, coarser, and redder herbage. Both are abundantly interspersed with wild flowers, representing the *irid*, *amaryllid*, and many other beautiful bulbous plants. The magnificent *amaryllis belladonna*, or "Natal lily," with its crown of massive pink striped bells, may, perhaps, bear the palm of pre-eminence. In the spring month both the woodlands and the pasture lands of Natal are as gay with bloom and verdure as an English garden. The aspect assumed by the country at this time is the more remarkable because of the transformation it effects. Whenever the drought of winter has thoroughly dried and parched the long stems of the rank grass, the natives, and occasionally the white settlers as well, ignite the pastures, and leave the flames to rush furiously onward wherever the wind may take them. For several weeks the air is charged with smoke, the night is illuminated by lines and circles of linked fire, and the hills are blackened. But when September arrives, the bright blades of the fresh pasture appear, and with wonderful rapidity the land is mantled in the freshest green. This wasteful and dangerous practice, so impoverishing to the soil, and so hurtful to vegetation, is now prohibited by law, but the mischief is so easily originated, and the habit is so strong in the aboriginal breast, that the evil cannot readily be restrained.

The geological formation of this portion of South-

Eastern Africa is akin in its character to that of the surrounding territory; granite, sandstone, trap, and shale are the prevailing rocks. Granite rocks are formed in every part of the colony; sometimes as loose boulders, crowning the summit of a high hill; sometimes as large slab masses protruding from the surface. Many of the lower elevations are of granitic formation. A striking characteristic of South African hill scenery is the tabular shape assumed by many of the mountains. Huge masses of sandstone, perpendicularly faced on all sides, crown baseworks of granite, and present to the eye the table-topped hills so often remarked by early voyagers. The summit of these curious and isolated eminences often consists of a wide area of undulating ground, covered with rich pasture, and occasionally watered by springs of running waters. Trap is very abundant throughout South-Eastern Africa. It is found thrusting itself alike through the granite and the sandstone, spreading out in rolling plains, or swelling up into bold hills. The "Silurian" sandstone of Natal contains no fossil remains of any importance, except the impress of vegetable forms found in some of the earlier formations. In the region bordering on the southern boundary some interesting petrifactions have been found near the coast. Shale is very plentiful indeed, and being easily obtained and readily worked, is largely used in building. It is a light, flaky stone, the hardened detritus of older formations, and requires protection from the sun to be permanently preserved.

Very little is known as yet regarding the mineral resources of the colony. Surveys have been made, explorations attempted, and speculations indulged in; but, beyond a few raw facts, no complete and comprehensive classification has been attained. The natives have always been in the habit of using iron weapons, obtained by the rude smelting of surface ore. Ironstone is encountered over the whole district, in the shape of small boulders, and though never developed, there is reason to believe that the country is largely endowed with this valuable metal. Coal, a resource of inestimable importance to a land well placed for the purposes of maritime traffic, has been found in such quantities, and of such quality, as to indicate its existence in an available form and to an adequate extent. Plumbago is of frequent occurrence, and lead is also asserted, by credible authorities, to be present. The discovery of copper has often been announced, but the discovery has never been followed up. Traces of silver have also been observed. Ten years ago, when the prospects of the colony were not cheering, owing to the successful competition of the Australian gold-fields, a large reward was offered by an influential body of colonists to the discoverer of gold in sufficient quantities, but the reward was never earned. The aspect of many parts of Natal is very similar to that of the Victorian gold-fields. Quartz in some localities is singularly abundant, and mica is present in the beds of some of our rivers. Gold ornaments have been exhibited by natives, as the product of places in the interior, and very sanguine expectations have been hazarded in regard to the existence of the precious ore. Time, however, has yet to reveal whether Natal is to be another source of auriferous supply. It will thus be seen that the mineral possessions of this part of Africa remain entirely undefined and uncertain, and may prove in the future to be either much greater or much less than they are now presumed to be.

Twelve years ago Natal was the home of many wild animals which can now be only found in the remoter wilderness. The elephant, the lion, and the rhinoceros, had at that time a habitat within the limits of the colony. Now, however, they, and most other varieties of feræ have retreated before the inroads of hunters and settlers, not merely out of Natal, but even beyond Zululand and the Orange River Free States into the jungles, and on the plains of regions where the sportsman and the wandering savage are the only human visitants. Brute life is principally represented by the antelope tribe, known locally by the generic name of "bucks." Of these there are many varieties, ducker-bucks, riet-bucks, rhe-bucks, oribis, blue-bucks, spring-bucks, bush-bucks, and blesse-bucks, are the most common of the smaller-sized species. Elands, hartebeests, wildebeests (gnu), quaggas, and zebras, are all of a much larger size, and are only found during the winter months in the country below the Drakenberg. Hippopotami, or sea-cows, are often encountered on marshy lakelets or reedy river-beds. Panthers, miscalled "tigers" by the colonists, occasionally demonstrate their existence by a raid in some farmer's cattle-yard or sheep-fold. Alligators, or more properly crocodiles, are far too numerous in some of our rivers, but they will doubtless disappear as population and traffic increases. Tiger-cats, hyænas, jackals, wild dogs, wild pigs, porcupines, antbears, hares, rock-rabbits, monkeys, and baboons, may be mentioned as the most common of Natalian quadrupeds. It must be understood that the only way in which any of these animals become offensive to European settlers is by occasional depredations among calves or poultry. There are residents of twelve years' standing who have never seen anything more offensive than a monkey or a mole. Snakes are numerous. The cobra, the puff adder, and the mamba are the most obnoxious, but it is a rule that unless trodden on or attacked, they never molest man; the last, however, exhibits a most remarkable propensity to chase any human object of its anger.

The ornithology of Natal has not been the subject of any thorough scientific research. The collection of stuffed birds exhibited at South Kensington was a fair representation of its class, and the admiration it evoked would be renewed on a personal experience of the bird-life which abounds in the jungle and the forest. Game birds are found in great variety. Foremost among these must be placed the paauw, or wild turkey, a sort of bustard, of large size and delightful flavour. The koran is another winged *specialité*, dear to the hearts of sportsmen; pheasants, quails, pigeons, guinea-fowl, partridges, and snipes are plentiful enough in the field or in the bush. Ducks are more choice in their localities. The long-legged tribes abound everywhere, either as storks, cranes, or pelicans. That devourer of snakes, the secretary-bird, the voracious locust-bird, the diminutive but noisy honey-bird, the big-billed toucan, the long-tailed kafirfinch, the gay lori, the brilliant kingfisher, the African canary—these are only a few of our Natalian birds. There are also birds of a fiercer disposition. Vultures are in wait for carrion; hawks threaten your broods; kites and owls are common; the golden eagle and the sea eagle haunt the mountains and the shore; the ubiquitous crow is super-abundant, and has here assumed a white collar round its neck. Varied in plumage, eccentric in their notes, strange in shape, and peculiar in habit, the colonial birds supply an interesting sphere of study to the naturalist.

I cannot enlarge upon the other varieties of animated life. Entomology is richly illustrated by innumerable tribes and divisions. *Orthopterous* or fanwinged insects have notable representatives in immense locusts, multitudinous grasshoppers, twig-shaped *phasmidæ*, grotesque mantes; in countless beetles, crickets, and cicadæ. Butterflies of every hue suffuse the summer air. Fire-flies illuminate every rivulet and marsh. Ants, from the infinitesimal red emmet to the destructive termite, are one of the most serious pests inflicted on the colony, but the insect known locally as the tick (*ixodes*) is universally held to be the most offensive to human beings and to quadrupeds. There is one almost invisible variety, which has a passion for burrowing into and irritating the skin of man, and there is a larger species which attacks cattle in such numbers and with such rapacity as to be a positive injury and nuisance. This obnoxious little creature is principally confined to the coast-lands. If space permitted it would be expedient to notice the spiders, moths, centipedes, and other kindred varieties, but this bare allusion to our superabundant insect life must suffice.

Thus much in regard to the physical features and natural resources of Natal. This rapid *resumé*, inadequate

though it be, will have sufficiently shown that every branch of the three great kingdoms of nature is, in a greater or lesser degree, represented. The soil is varied and fertile; the rocks, though palæontologically barren, are in all probability commercially valuable; the vegetation is rich, luxuriant and novel; the climate is agreeable, and the fecundity of brute life is only a pledge of natural abundance and an earnest of future wealth. To the savant, the naturalist, or the speculator in search of new fields of enterprise, this part of South Eastern Africa may be commended as a generous region of research, or as hopeful ground for investment.

Natural Capabilities.

In describing the commercial products of so rich a country, great brevity will be requisite. Twelve years ago, Natal had no exportable products to send her creditors. Her capacities at that time were based on supposition, and subject to uncertainty. Her coastlands were not only wholly uncultivated, but were a *terra incognita* to the colonists themselves. Her position, then, in the year 1850 was identical with that of Britain in Druidical times, or of North America in the days of Raleigh. When the first World's Fair was held, our colony had not merged from its helpless babyhood; it had failed so far to find its feet; it had neither a name nor a voice of its own. A cycle of eleven years has elapsed; another exhibition opens its doors, and, instead of the few karosses and the prodigious oxhorns that represented our resources in 1851, we have had more than 250 specimens, surrounded by pictorial illustrations of the colony, occupving a court of their own, which was furnished entirely by local artificers and local industry, and which was the only appearance made by any of the South African colonies or states.

It has already been remarked that the rapid fall in the elevation of the ground which ensues between the mountain boundary of the colony on the west and the sea coast, results in a wide and unusual diversity of products. Thus, *par exemple,* on the littoral or coast belt, sugar, arrowroot, coffee, ginger, and other tropical plants are grown and manufactured. About forty-five mills, mostly driven by steam power, are employed in manufacturing the eleven thousand acres of cane scattered in different plantations along the shore. A colonial exhibitor received a medal for one of twelve excellent samples of sugar which were sent to the Exhibition, and other samples were highly commended. There is no question about the success of this branch of agricultural enterprise. It has been produced with remunerative results alike by men of the smallest means and by the possessors of capital. The yield per acre is fully equal to that obtained in the Mauritius, where the application of manure, never yet known in Natal, is an indispensable expedient. I may state that a personal inspection of the latter island has convinced me that the prospects of Natal as a sugar-producing country are not depreciated by a rigid comparison between the two places.

The coffee grown in Natal has been declared on various occasions, by competent judges, to be of first-class quality. No reliable data as to yield can be furnished, as the plantations in existence are neither large enough nor old enough to justify any general conclusions. That the tree thrives and bears a berry of excellent flavour has, however, been sufficiently ascertained, and considerable attention is being devoted to the cultivation of the shrub. Tea is a product of very recent introduction. Almost the first sample prepared was exhibited at South Kensington, and received private commendation. In soil and climate much similarity subsists between Natal and China. Arrowroot has given occupation to many agriculturists of small means, and, were the home market more extensive and encouraging, any quantity might be produced. The article manufactured might almost be classed with Bermuda Indigo is indigenous to the soil. Its growth was attempted on a large scale some years ago, but doubt still exists whether the climate will not interfere with the successful manufacture of this delicate but important staple. Ginger and turmeric are both grown for private use. Tobacco is found to thrive all over the colony. A coarse variety of the plant has long been grown by the natives of South Africa, who are inveterate smokers and snuff takers, and cultivation is found to supply a leaf of excellent quality. At this moment experiments are being made with Latakia, Virginia, and Manilla tobacco seed, and there is every prospect of a large export hereafter.

In the midlands and uplands of the colony agriculture assumes a more European character. Indian corn or maize, and oats, are grown largely over the whole district, but in these higher localities wheat, barley, pulse, and other descriptions of grain are cultivated. Wheat, I should state, is by no means a common or hardy product, and has not been so successfully acclimatised as other sorts of corn. Vegetables, both in European and tropical forms, are readily grown. Pumpkins, melons, squashes, yams, and sweet potatoes, are found side by side with beans, peas, and the other kitchen favourites of northern lands. Fruit has an equally wide range. From the pine apple and the papaw to the apple and the peach, there are few varieties of fruit that cannot be luxuriantly grown. Some of the most familiar English plants, the gooseberry, the strawberry, and the currant, are perhaps the exceptions.

Stock farming has been impeded by the devastations of pleuro-pneumonia amongst the cattle, and by the periodical outbreak of a fatal epidemic amongst horses. The first scourge has been partly counteracted by inoculation, and seems dying out, after having swept South Africa. The latter is only an occasional, and not a regularly recurrent evil. Imported blood, in the shape of bulls, cows, and thorough-bred stock horses, is constantly introduced from England and the Continent, and is effecting a vast improvement in the character of local stock. Formerly Natal was known as a land overrun with cattle, and there is every reason to anticipate that the many million acres of her pasture lands will continue to feed the flocks and herds of a pastoral people.

Fibre-yielding plants have a genial home in Natal. A coarse description of flax is a native of this country. Many of the wild grasses and shrubs afford textile fibres of great fineness, silkiness, and tenacity. The Zulus make string and rope from a hemp plant that grows in spontaneous abundance about their kraals. Here, however, as in other branches of botanical knowledge, great ignorance of local resources prevails. More is known about the common fibre-staples of commerce. Silk can be produced to any extent, as the mulberry grows with remarkable rapidity, and the worms are specially prolific. It is to cotton, however, that the colonists look most hopefully under this head. Twelve years ago several tons of this staple were grown and shipped, but the enterprise has not, until quite recently, been prosecuted; now the natives are being encouraged by government to cultivate the plant on their own account, and several bales of fair average quality have been produced in this way. Many European colonists are turning their attention to cotton cultivation as a remunerative occupation. It has been ascertained that sugar and cotton can be advantageously grown together, as the busy season of one product is the idle season of the other, and thus the all-important consideration of labour is economically met. The very indifferent specimens of Natal cotton in the International Exhibition, though by no means a fair representative of what the colony produces, were, nevertheless, priced by the Manchester Committee at rates varying from 1s. 0½d. to 3s. per lb. Later samples, privately sent to cotton-spinners, have been valued at a much higher rate. The manager of one of the largest mills in the kingdom told me, not long ago, that the only fault of our cotton was the extreme length of its staple, it being too long for the machinery required by other varieties. Careful calculations warrant the belief that cotton of an excellent description can be grown in Natal at a cost of from 4d. to 6d. per lb., and we may sanguinely anticipate—that as Natal can produce cotton in remunerative quantities and of good quality, on

favourable terms—as it possesses a delightful climate of proved salubrity—as it has within its borders and around it, up to indefinite latitudes, a large colonial aboriginal population—and as its maritime and commercial facilities are great—it will be one of the sources from which Manchester shall hereafter derive these supplies so necessary to the national prosperity.

This brief sketch of our natural resources, inadequate though it is, will suffice to show how singularly favoured the land is in the means of wealth; how varied are the openings presented to men of energy and enterprise; how wide and hopeful is this field of action to those who have capital to invest or labour to expend.

COMMERCE—IMPORTS—REVENUE.

The extent and direction taken by the commerce of a country are of course very largely governed by the maritime advantages it enjoys. It may here be stated, therefore, that the Port of Natal is the only real harbour, worth the name, that occurs throughout 700 miles of seaboard. Between Algoa Bay and Delagoa Bay there is but one secure and accessible haven, and that is our beautiful land locked bay. A sandbar at the entrance has hitherto prevented the ingress of vessels of more than 800 tons burthen, but, the colony having agreed to the negotiation of a loan of £165,000 for the special purpose, two breakwaters, designed by Mr. J. Abernethy, C.E., and constructed on the model of one at Blyth, are now being run out. These works are contracted for to be completed within six years, and in four years it is anticipated that their completion will secure a permanent depth of water at the entrance of twenty-five feet, when Natal, from its relative position, must be not only the gateway through which shall pour the produce and the supplies of all South Eastern Africa, but the natural calling place for many homeward-bound or distressed ships. There is a steam-tug attached to the port, and a railway, the first opened in South Africa, connects the harbour with the town of Durban. A patent slip is also likely to be erected.

The progress of shipping and trade will be best understood by the table in the next column. It will be seen that trade has doubled itself in the last five years, and that the exports are nearly five times greater than they were ten years ago.

In order that the development of productive industry may be more fully understood, I append a table (see below) giving a bird's-eye view of our principal exports during the past ten years. Wool and ivory—the oldest in the list—still remain prominent items, and the first will increase in a faster ratio hereafter, as sheep-farming is one of the most successful and hopeful of our many industries. Sugar will also reveal a more rapid increase, while cotton, coffee, and live stock will be more auspicious features in the returns for the coming ten years than they are in these now given.

TABLE OF IMPORTS.

YEAR.	SHIPS INWARDS.		VALUE OF GOODS IMPORTED.	IMPORT DUTIES RECEIVED.
	No.	Tons.	£ s. d.	£ s. d.
1846	30	3,528	41,958 10 3	3,510 16 6
1847	27	3,226	46,981 8 3	3,207 1 11
1848	32	4,166	46,204 6 10	4,705 3 3
1849	40	5,905	55,921 14 11	5,802 6 0
1850	64	16,581	111,015 11 5	10,911 13 0
1851	52	8,951	125,462 6 8	12,122 19 7
1852	45	6,138	103,701 5 4	10,003 12 0
1853	43	5,015	98,534 13 2	9,800 3 4
1854	37	8,049	112,492 6 11	10,816 1 8
1855	27	3,705	86,551 9 9	8,612 2 6
1856	41	5,007	102,512 4 7	10,227 2 4
1857	40	8,117	184,549 0 0	14,626 12 6
1858	45	11,025	172,832 0 0	15,928 17 7
1859	52	10,494	199,917 0 0	18,651 12 11
1860	71	15,464	354,987 0 0	33,861 0 2
1861	97	18,192	402,689 0 0	37,400 6 5

EXPORTS.

YEAR.	SHIPS OUTWARDS.		VALUE OF GOODS EXPORTED.		TOTAL VALUE OF GOODS EXPORTED.
			Colonial.	Not Colonial.	
	No.	Tons.	£ s. d.	£ s. d.	£ s. d.
1846	32	3,678	15,409 7 9	1,733 8 0	17,142 15 9
1847	27	3,226	13,669 4 6	707 10 0	14,376 14 6
1848	31	3,761	10,683 17 4	183 0 0	18,866 17 4
1849	39	6,066	11,265 0 0	726 6 3	11,991 12 3
1850	61	14,940	15,613 12 3	1,492 13 0	17,106 5 3
1851	52	8,829	17,423 10 0	4,393 15 0	21,817 5 0
1852	49	6,460	20,164 16 6	7,680 18 3	27,845 14 9
1853	43	6,138	26,684 0 10	9,764 15 0	36,458 15 10
1854	39	7,823	37,555 1 0	6,106 1 0	43,661 2 0
1855	30	4,287	45,126 14 4	6,946 14 0	52,073 8 4
1856	41	5,149	53,931 2 5	2,631 11 0	56,562 13 5
1857	41	7,973	77,844 6 9	4,652 4 6	82,496 11 3
1858	44	10,690	90,882 0 0	9,705 0 0	100,587 0 0
1859	49	9,811	103,472 0 0	6,942 0 0	110,415 0 0
1860	64	14,164	129,391 0 0	10,307 0 0	139,698 0 0
1861	100	18,655	108,920 0 0	10,287 0 0	119,207 0 0

TABLE OF EXPORTS.

	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Wool	2,026 10 0	3,450 0 0	3,366 0 0	8,331 10 0	7,325 10 0	9,887 10 0	11,360 0 0	23,988 0 0	27,790 10 0	32,887 19 10
Ivory	6,274 10 0	8,634 0 0	14,688 10 6	13,504 10 0	13,715 0 0	18,170 0 0	31,754 0 0	17,618 0 0	21,064 0 0	22,825 0 0
Butter	6,700 13 0	5,506 0 0	8,444 10 0	8,915 2 1	7,591 0 0	12,142 8 0	15,685 0 0	17,610 0 0	19,306 0 0	14,582 0 0
Hides	1,196 10 0	902 14 0	2,041 0 0	3,201 6 6	11,568 10 0	22,365 2 5	16,387 0 0	11,339 0 0	15,920 16 0	9,793 3 0
Arrowroot ...	... ...	31 12 0	97 10 0	999 7 0	1,826 10 0	3,135 18 6	5,464 0 0	13,336 0 0	6,680 1 6	4,684 11 0
Wood	... ...	1,958 15 6	3,599 0 0	1,705 4 6	691 6 4	885 1 0	1,301 0 0	298 0 0	209 0 0	... ...
Sugar	... ...	..	2 0 0	19 5 0	483 15 0	2,008 15 3	3,067 0 0	8,368 0 0	32,005 16 0	19,415 16 0
Meat	... ..	651 17 0	298 0 0	3,369 10 0	5,468 15 0	869 10 0	... ..	299 0 0	96 0 0	... ...
Grain	... ...	... ...	... ...	... ...	... ...	... ...	... ...	2,467 0 0	1,030 0 0	190 0 0

The commerce of the colony is carried on by wholesale importers and retail storekeepers. Commodious warehouses and well-appointed shops are numerous in the two principal towns. Five banks—three of which are local companies, one a private establishment, and the last a home-branch—absorb the financial operations of the community. These institutions represent an aggregate capital of nearly £200,000. Like all other colonies, Natal suffers from an insufficient currency. The development of enterprise in a new country is in advance of its available capital, and money commands twelve per cent. interest on the best security. A too diffuse credit system is the greatest bane we have, but it is hoped, as wealth and population multiplies, that this evil—a necessary condition of colonial existence—will be remedied. A Chamber of Commerce has been established some years, and its functions may be usefully employed.

The commercial relations of the colony are somewhat extensive. In addition to the internal requirements of the European settlers, there is a large Zulu population to supply with beads, blankets, hoes, and other knick-knacks. There is also a considerable trade with powerful tribes on the northern borders carried on by itinerant traders, some of whom go in ox-waggons, while others march afoot, carrying their wares in packs borne upon the shoulders of perambulating natives. Both these classes

pass from kraal to kraal until the stock of goods is sold, and cattle obtained in exchange. A strange wild life is that of these Zulu traders, something akin to that of the North American trapper, as immortalised by Irving. Singlehanded, and all but unarmed, they wander into the midst of barbarous tribes, with whom warfare is a habit, and massacre a common occurrence, and yet, so great is the prestige of their colour and race, that I can cite no instance of one of them being maltreated. Such is the moral influence of national integrity, humanity, and power.

Beyond Natal, extending westward and northward, are two large free republics, each being many times larger than the colony, principally occupied by the descendants of the Dutch Boers, whose exodus from the Cape Colony 30 years since I have already referred to. That lying nearest to Natal is the Orange Free State, formerly, when under British rule, known as the Sovereignty, and offering boundless capabilities upon its vast prairie plains for sheep pasturage. The state north of this is called the South African (or Trans-Vaal) Republic, with a more purely Dutch population, and a diversified range of resources. With these communities the mercantile houses of Natal carry on a large trade by means of branch establishments, some of which have proved the nuclei of prosperous townships. To a country having such wide connexion, the matter of transport is of vital importance. So far waggons, drawn by long teams of oxen, have carried traffic, and for some time to come they will be the only available medium. Roads, however, are continually being made and improved, and bridges erected. The expenditure in 1862, under this head, was £13,707. A company has been formed in London to undertake the establishment of a railway between the seaport and Pietermaritzburg, the seat of government. The capital subscribed is £500,000, and the length of the line will be about 60 miles. This undertaking will be an immense boon to the colony.

If the revenue returns of a country are a sure index of its progress, Natal may show hers to the world with justifiable confidence. Beyond postal charges, customs duties, and a few stamp payments, there are no direct taxes levied, and yet, during the three years elapsing from December, 1858, the public receipts were trebled. By the table annexed, it will be observed that the main increase is under the head of customs, a significant and satisfactory sign. A tax of seven shillings per hut is imposed upon the native population, a small equivalent for the security and blessings they enjoy.

The following is an abstract of the Probable Revenue for the Year 1862, showing also the Revenue received under similar heads for the years 1861 and 1860.

	Estimate for 1862.			Revenue for 1861.			Revenue for 1860.		
	£	s.	d.	£	s.	d.	£	s.	d.
Customs	40,050	0	0	37,471	12	4	33,927	1	0
Port and Harbour Dues ...	1,500	0	0	1,481	12	0	1,056	11	0
Land Sales	2,800	0	0	1,498	16	0	566	7	10
Land Revenue	9,895	13	4	5,800	9	2	3,997	9	10
Rents, exclusive of land ...	...			6	0	0	6	0	0
Transfer Duties	9,000	0	0	13,587	8	2	5,721	14	5
Auction Duties	2,200	0	0	2,175	3	3	980	12	11
Licenses	...			5	0	0	25	0	0
Stamps	2,500	0	0	2,644	9	6	2,417	19	6
Taxes	17,500	0	0	16,906	7	0	14,570	17	0
Postage	3,500	0	0	3,131	16	7	2,391	1	8
Fines, Forfeitures, and Fees of Court	2,500	0	0	2,040	12	4	1,977	11	10
Fees of Office	1,200	0	0	1,120	1	0	864	14	5
Sale of Government Property	1,500	0	0	7,841	10	3	70	8	11
Reimbursement in aid of expenses incurred by Government	3,500	11	9	7,083	18	0	4,114	7	1
Miscellaneous Receipts ...	3,600	0	0	3,258	13	1	2,657	16	0
Special Receipts	...			510	1	4	1,946	11	9
Interest	800	0	0	260	0	0	..		
Total	101,246	5	1	106,823	10	0	77,291	5	2

The time allowed me necessitates a very hurried glance at the social condition of the colony. In the absence of any reliable census, the white population may be assessed at about 15,000. Of these 2,500 are resident in the seaport town of Durban, and 3,500 in the city of Pietermaritzburg. Several villages are scattered through the country districts. Their modes of life, though crude in some respects, are more polished than in many other similarly situated communities. Never having been subject to a rush of emigration, the class of British settlers is of a superior order, and a higher degree of intelligence than is found in dependencies whose rate of progress has, owing to special causes, been greater. On this point I may quote the words of His Excellency Sir George Grey, than whom no one is better qualified to give an opinion:—"Among those who have arrived from Great Britain are included a considerable number of English gentlemen of good education, of great intelligence, and who have had much experience in Natal. With a considerable acquaintance with British Colonies, I should say that in the character of its European population, in proportion to their total number, Natal might, with no disadvantage, be compared with any other colony. It was partly from the intelligence and prudence, with which I cannot but think that its inhabitants of European descent are peculiarly distinguished, that their requests to have some share in legislating for their country were of so modest and simple a character."

This flattering testimony will serve to explain why so much activity and interest is displayed in social movements. The institutions of the colony would require more space for detailed description than can here be given them. There are several Agricultural Societies that hold annual shows, and stimulate enterprise by the distribution of prizes. At Durban there are large Botanical Gardens, where the vegetable products of the soil may be learnt at a glance. There are Literary Institutions and Book Clubs, Building and Investment Societies, Young Men's Improvement Associations, and other kindred organisations. Education is vigorously sustained and promoted under the able superintendence of Dr. Mann, F.R.A.S. Fifty schools are established, and in receipt of pecuniary aid from the public exchequer, and fourteen private seminaries are under government inspection. In these 1,100 scholars acquire the rudiments of practical knowledge. The Corporations of Durban and Maritzburg have endowed, with £5,000 each, two colleges that will shortly be in action, and the local government contributes an equal amount. By such instrumentalities the colonists hope to avoid the retrogressive tendencies incidental to their condition.

The claims of religion are liberally recognised. Almost every religious denomination is represented in either of the towns by a substantial edifice for the use of its worshippers. The Church of England, under its large-minded Bishop, vigorously pursues its operations, and Independents, Wesleyans, Presbyterians, and Baptists, have all a distinct organisation. A Roman Catholic Church, under the charge of a French Bishop, has been established many years. In the country districts, in addition to the very numerous mission establishments, there are many churches and chapels.

I have been unable to collect statistics of crime, but I may state that there are only three prisons in the country. Remarkable security for life and property is enjoyed. Upon farms it is quite unusual to fasten doors or windows, and houses are sometimes left exposed and tenantless for weeks together with impunity.

The Zulu Kafirs, of whom it is impossible to give more than a passing notice, number in Natal about 190,000 souls. They are mostly refugees from neighbouring territories where the tyranny of native chieftains affords no protection to the subject. Owing to this fact, our colonial population is wholly fragmentary and disorganised in its composition. There is no cohesion among its parts, and this want of union, together with the trivial jealousies which prevail, is an effectual bar to any hostile movement. Throughout the Kafir war of 1852-3, and ever since,

peace has been maintained unbroken, and there is no reason to look forward apprehensively to the future. Twenty years of peace have matured a generation of Zulus with whom bloodshed is but a tradition rather than a fact. They know little of war, except by hearsay or by dim childish recollection. The pacific experiences of childhood and youth have blunted the warlike instinct and effaced the sanguinary reminiscence. Unlike the natives of New Zealand, the Kafirs of the Cape frontier, or the Red Indians of America, a cycle of domestic servitude and political order has tended to deaden, if not to obliterate, the worst passions of the savage nature. Like all other barbarians the Zulus are a mixture of good and bad. They are lighthearted, active, deferential to their superiors, and attached to those who treat them well. But they are also avaricious, indolent, passionate, deceitful, and sensual. It is very probable that under firm, just, and consistent treatment their better natures may be made to predominate. They know how to obey a stern master, who has, at the same time, won their confidence and respect; but they know also how to presume upon well-meant though ill-judged indulgence and familiarity. Any new license granted them is taken advantage of and abused. Naturally independent, they will, if allowed, become personally insolent. The Zulu is eminently susceptible of civilisation, but he is equally open to the injurious impressions left by vicious example and criminal association; he may as readily be educated to roguery as to probity. It cannot be said that he has the instinct of plunder normally developed in his breast under any but special circumstances. It is only when he has learnt the vices of civilisation that his natural cupidity is aroused, and, contaminated by contact with a superior race, he essays to follow in its footsteps. In illustration, I may allude to the unpalatable fact that a colonist prefers, as a servant, a raw Kafir from his kraal to a "civilised Kafir" from a Mission Station, having found by experience that the latter is too often the greater scamp of the two. It is doubtful whether cotton will, immediately at any rate, be largely grown on their own account by the natives. They are very crude agriculturists, and a long process of initiation will have to precede their cultivation of the plant in sufficient quantities. They are averse, moreover, to systematic industry; they like to cultivate their own hillside patches in their own capricious and irregular way; they rarely replant the same piece of ground for successive seasons, and are utterly unused as yet to any rule or routine whatever in the matter of agriculture, living as their fathers lived, and as they would fain still live, on the produce of scattered fields eccentrically hoed up by their slave wives and marketable daughters. It is one of the anomalies of native government that in a free British colony, woman, the dearly-prized helpmeet of the European, is, according to the laws of our colonial population, a chattel, and on reaching a marriageable age is disposed of by her father, wholly irrespective of her own feelings in the matter, to the man who offers for her person the highest number of the fatted cows.

The number of natives that enter service for different periods during the year has been reckoned at 20,000. This is but a small proportion of the native population, and the evoking of more labour-power from this—the proper element—is, and ever has been, a fruitful topic of local discussion and legislation. Three years ago 1,600 East Indian coolies were imported, and found very useful. Another importation is being talked about, but I hope that improved government, more thorough control, and the tentative adoption of European ideas and habits, necessarily resulting from longer contact, will, in course of time, render the Zulu Kafirs in Natal a working and productive element in the community.

In no part of the world are mission operations more extensively prosecuted than in Natal. Every creed and country of Christendom has planted a station in some locality or other. The Americans were the first in the field, and are the most numerous. Hospitals are founded for the use of the natives, and every encouragement afforded to all movements tending to advance the native morally. The colonists know that their own prospects are intimately involved in the social elevation of the aborigines around them, and, whatever may have been said to the contrary, are most anxious to see the native assume the duties and responsibilities of a civilized man. In saying this I only give expression to the sense of the whole colony.

GOVERNMENT.—DEFENCES.—LOYALTY.

Politically speaking, Natal is better off than many colonies of her age and standing. She has at the head of affairs a governor, paid by the colony, though appointed by the Crown. With him are associated several heads of departments and public servants, also nominated from home, who form an Executive Council. Then there is a Legislative Council, an assembly composed of twelve elective and four official members. The first-named are chosen for a term of four years by the colonists, acting on a very liberal franchise. This assembly deliberates upon and passes the laws of the land, and, though possessing the power of rejecting any measure, exercises no executive control whatever, and does not influence by its decisions the administration of Government. The plan is considered defective in this respect, and will probably be remodelled, so as to admit a modification of the responsible element. The machinery of government will be best described by the following return of heads of expenditure.

EXPENDITURE.

	1862.			1861.			1860.		
	£	s.	d.	£	s.	d	£	s.	d.
Civil Establishments—									
The Lieutenant-Governor ..	233	0	0	249	18	10	195	0	0
Executive Council	50	0	0	50	0	0	50	0	0
Colonial Secretary	854	0	0	877	12	0	1,010	8	0
Secretary for Native Affairs.	198	0	0	198	0	0	198	0	0
Colonial Treasurer	250	0	0	250	0	0	246	12	9
Auditor	585	0	0	612	7	6	582	10	
Registrar of Deeds and Distributor of Stamps	521	10	0	513	3	4	480	0	
Surveyor-General	325	0	0	325	0	0	404	10	11
Colonial Engineer	711	9	0	699	5	10	405	4	5
Customs	1,485	0	0	1,442	4	6	1,428	17	3
Port Office	3,522	2	2	2,553	2	7	3,734	13	9
Post Office	1,052	7	6	1,050	19	10	869	10	5
Immigration	287	8	6	273	8	6	...	...	
Field Commandants and Cornets	460	0	0	438	18	4	422	3	0
Ferrymen	375	0	0	338	2	7	354	0	0
Judicial Establishments—									
Supreme Court	3,035	12	6	2,926	10	8	2,768	6	10
Sheriff	200	0	0	200	0	0	200	0	0
Attorney-General...	687	0	0	673	7	8	662	1	4
Division Courts	5,591	18	9	5,525	5	10	5,201	1	5
Ecclesiastical Establishments.	1,200	0	0	960	13	4	725	0	0
Education ditto ...	844	8	8	837	16	9	428	0	0
Medical ditto ...	502	6	8	516	18	0	428	16	0
Police and Gaols ditto ...	2,623	5	0	2,525	12	5	2,288	11	9
Pensions, Retired Allowances, and Gratuities	782	9	7	744	6	3	154	9	6
Revenue Services, exclusive of Establishments	880	0	0	1,064	16	1	744	10	2
Administration of Justice, exclusive of Establishments ...	485	0	0	1,009	19	10	473	7	8
Education, exclusive of Establishments	1,365	0	0	1,339	7	1	1,357	13	5
Hospitals, exclusive of Establishments	705	0	0	1,067	13	7	768	3	0
Police and Gaols, exclusive of Establishments	1,256	0	0	1,675	8	2	1,213	15	4
Rent	865	12	0	792	10	0	751	5	3
Transport	1,386	9	8	1,300	15	2	2,046	2	9
Conveyance of Mails	3,670	0	0	2,767	10	11	2,616	1	7
Works and Buildings	9,512	0	0	8,364	5	8	5,143	8	7
Roads, Streets, and Bridges ...	15,450	0	0	11,431	13	11	3,894	2	7
Miscellaneous Services	6,570	10	0	8,925	0	1	5,206	7	10
Aborigines, exclusive of Establishments	500	0	0	366	14	5	394	3	11
Immigration	11,420	0	0	12,454	8	8	17,120	15	4
Gratuities to Religious, Charitable, and Scientific Institutions	315	0	0	285	0	0	285	0	0
Colonial Allowances	1,000	0	0	1,000	0	0	...	...	
Special Payments	..	...		12,413	19	7	4,672	10	11
Interest	2,700	0	0	3,405	0	0	...	...	

The Bench is represented by a supreme court of three judges, and by divisional courts under the jurisdiction of magistrates. When the colony was annexed to the Cape, Roman Dutch Law was proclaimed, and is still the common law. Cases between natives are adjudged according to Kafir law, a rather complex variety of the *lex non scripta.* The bar is amply and ably filled. The press holds a respectable position, being represented by the *Natal Mercury*, published twice a week, and by five weekly newspapers. Pamphlets and books are occasionally issued.

When the question of colonial defence is being so earnestly discussed in English circles, it is pleasant to have to show that one colony, at least, is doing what it can to relieve the mother country of any superfluous burden. While Natal continues the frontier of British possessions in South Africa; while the numerical disproportion between its white and black populations remains so great; while the colonists are, as at present, allowed no voice whatever in the management or government of the colonial races, with whose interests they are so closely identified, the Imperial Government is, and will be, bound to afford a considerable measure of military protection. Hence the garrison that is stationed in the colony cannot, with any show of justice, or with a regard to prudence, be interfered with. But the colonists are far from idle, although under the sheltering wing of the mother country. A liberal allowance is voted annually out of the colonial treasury towards the maintenance of the military staff. A mounted police force is being formed at local cost, and this body will prove an invaluable protective agency. Volunteer corps are in active existence in every district, and rifle associations are popular institutions. It cannot be said of Natalians that they shrink from incurring the colonial responsibilities of self-defence, although the privileges of self-government are exercised to a very limited extent indeed. I place especial stress upon this matter, because f the general misconception that prevails in regard to the colonists' aims and intentions, and because I wish that the real *verve* of colonisation could be more thoroughly understood by my own countrymen. For who is the colonist, and to what do his labours tend? British in birth, thought, and instinct, he severs old ties, and unites his fortune and his family to exile and privation, not merely for the promotion of his personal interests, nor yet to retrieve a lost position, to restore a shattered fortune, or to advance his social status. He has a wider sphere of usefulness than the mere circle of his own concerns. He is, moreover, involuntarily assisting to carry out that world-wide movement by which Great Britain is being girdled by new nations and states, and all the benefits of free commerce and free government diffused over the globe. It is this which I humbly conceive to be such an honourable feature in the colonist's position. It may be seen evolving its practical results in the happiest modes, in a wider scope for public energy, in the enlargement of opportunities, in a loss of those more repressive class restrictions by which, in old communities, ability is often stifled and useful effort checked. I have known intelligent working-men take part in public movements, and hold posts of public responsibility, not through any overthrow of wise class distinctions—for in social life these boundaries even in a colony are still maintained—but simply through their reputation for intelligence and good sense, and through a conviction that their deportment in these capacities would bring honour to themselves and benefit to their fellow colonists. The colonist's work there being one of such present utility and future import, it seems strange that his interests should be treated so carelessly and his desires so often misconstrued. He has not, as seems frequently imagined, alienated all claim upon Imperial regards, lost all loyal sentiments and patriotic aspirations. On the contrary, I know by twelve years, association, by personal intimacy, and by the feelings that animate my own colonially affected breast, that there is amongst the British inhabitants of Natal, as much devoted attachment to the Queen, as much pride in all that concerns the prosperity and the glory of our nation, as strong a desire and determination to remain British subjects as there can be amongst those who have never passed through the toils or the vicissitudes of a colonial life.

I must now close this imperfect sketch of a valuable dependency. The future of Natal is bright with hope, for capital and population are flowing towards it with a steady pertinacity that augurs well for its continuance. In fifteen years the colony has emerged from a state of barbarism to one of comparative civilisation, and during that period we have witnessed the reclamation of tens of thousands of uncultured acres, and the upspringing in the remotest parts of the colony of incipient villages and substantial farmsteads. There is every probability that the rich wastes of Zululand on the north will before long be annexed to the colony, while the fat pastures and vast forests of Noman's land on the south have already extended our territorial limits by two or three million acres. It would be easy to point out how great a future is opening to the several States in South Africa, for in addition to the Cape Colony and Natal, to the Orange Free State and the South African Republic, further even yet in the luxuriant jungle lands and savannas of the north, the English trader is indomitably pressing on his way towards the Equator, laying bare to the growing enterprise of a commercial age territories that have hitherto been falsely regarded as hopelessly sterile and desolate. It needs little prescience to foresee that this immense range of territories, comprising, as it does, six established Colonies or Republics, each having independent resources, individual interests, and separate responsibility, shall yet be known as the South African Confederacy, the free, and let us hope, the concordant Italy of the Southern world.

DISCUSSION.

The Bishop of Natal said he hoped there was some Natalian present who was better acquainted with the mercantile proceedings of the colony than he was. He had listened with great interest to what he considered was a very able paper, and he thought Mr. Robinson, who was a very intelligent man, and the editor of one of the leading newspapers in the colony, had favoured them with some valuable information as to the present state of Natal, its products, and future prospects. There was nothing which he (the Bishop) could add to those observations, and but little that he wished to correct; he would, however, draw attention to one or two points which he noted during the reading of the paper, and he was desirous of saying a few words on one subject especially, viz., the condition of the native tribes of the colony. Mr. Robinson had regarded this matter in his paper from a colonial point of view; he hoped they would allow him (the Bishop) to view it rather from a missionary point of view. He concurred in all that had been said as to its being the duty of Englishmen, going forth to these colonies, to realise the responsibilities under which they lay, as having been intrusted by the Great Creator with the care of the inhabitants of these distant regions, and as being thus privileged amongst the nations of the earth. They knew that their own countrymen had been gifted with wonderful powers of mind and of government; they knew that we had had placed in our hands large colonies, and amongst them this district of Natal; and that colony was inhabited by native tribes, for the most part in a state of barbarous ignorance, amongst whom we were now introducing civilisation and Christianity. He thought no one in this room would doubt that we had received this colony in charge from Him who was the Great King of all the earth; and the blessings of peace in this colony were only to be expected if we did our duty to the native tribes, not leaving them in ignorance and barbarism, but endeavouring to raise them to that high status which we ourselves occupy. Mr. Robinson had fully recognised the desire of the native community to avail themselves of the benefits of education, which, however, had not at present been carried on to a satisfactory extent. The natives now

contributed towards the taxes of Natal £17,000 a year, a very considerable sum to be raised from a barbarous population; and out of that sum Sir George Grey had appropriated £5,000 for spreading instruction amongst the people. The local government of the colony had been for two or three years past endeavouring to carry out the measures devised by Sir George Grey, but he did not think it could be said that they had done so with any great amount of success, seeing that at present, out of a native population of 190,000, there were only about 5,000 persons under direct teaching. It would therefore be seen that there was yet a great work to be done. That the natives were capable of being taught and raised from their present barbarism he had the most ample proofs; and he thought it would interest the meeting to hear one or two letters read which he had received from natives of Natal who had communicated their proceedings to him, asked his advice in difficulties, and informed him how things were going on. He could have wished that Mr. Robinson had omitted from his paper the observation wherein he had cast rather a slur upon the missionary labours, by saying that the colonists would rather employ a raw Kafir from the kraal than a civilised Kafir from a mission station. Mr. Robinson further remarked that "the Zulu was eminently susceptible of civilisation, but he was equally open to the injurious impressions left by vicious example and criminal association." That was doubtless true; and they would readily understand that amongst the mixed population of a young colony there were many influences tending to corrupt the natives, and to which of course those who came to the missionary stations became especially exposed, and from which it would be easily understood that they were exempt when in their native kraals. He had often felt it his duty, when natives had spoken to him of the misconduct of Englishmen who had forgotten those high principles which were the characteristic of our countrymen, to point out that such men were not Englishmen in the true sense of the word; that they did not represent truly the English character, but were a disgrace to the name of their country. There were other disadvantages under which the natives laboured; they were ignorant; they could not speak the English language and their masters could not speak the native tongue. Moreover, the natives were not always so constant at their work as the Europeans expected. An Englishman who had invested capital in the colony naturally expected the natives to work regularly in his employ, and was disappointed at finding those on whom he relied affected by an irresistible desire to visit their kraals, and mingle amongst their kindred, perhaps at the time when the master most needed their labour. That was a very trying thing for Europeans generally. Then, again, the want of intercourse in language was a great difficulty. The Englishman expected the native to master the English language, but he would not occupy himself in learning the Zulu tongue. The consequence was, natives frequently made great mistakes, and the masters were disappointed in not finding their orders properly carried out. In speaking of a civilized native the colonist would mean one with a coat upon his back, although now even the uncivilized native was required to wear some sort of garment. It used to be sufficient to wear any kind of upper garment; and he knew an instance in which a man considered he was carrying out the law by wearing a lady's crinoline as his sole article of dress. Latterly he found that a law had been passed that the natives were required not only to wear a coat, but trousers also. The only difficulty about that was, that, inasmuch as their wives and daughters had not been taught to sew, it was not clear how these articles could be kept in repair. The right rev. prelate then read two letters which he had recently received from native youths, who had been trained as printers and bookbinders, and who were engaged in printing various books of the Bible translated into the Zulu language. Their education was such that they readily composed the type from manuscript either in English or Zulu, and from those letters he (the Bishop) said it would be seen that much might be done in improving the native tribes, and therefore he hoped the reproach which Mr. Robinson had no doubt unintentionally appeared to cast upon the missionary labours in this colony, would be shown to be without foundation.

Mr. P. L. SIMMONDS said, the Bishop of Natal having confined his remarks chiefly to the social condition of the colony and the character of the native race generally, he might add a few words upon some other points touched upon in the paper. This was one of the youngest of Britain's colonies, and without any of the adventitious aids which had advanced the progress of other young settlements. It was advancing steadily in all the elements of natural wealth. All those who remembered the late International Exhibition could not fail to have been struck with the picturesque and highly interesting court of Natal, where were grouped together products which had attracted great attention both among foreigners and Englishmen. While, owing to political squabbles, the older Cape Colony failed to put in any appearance with its products, Natal, as had been observed in Mr. Robinson's paper, thus became the sole representative of the South African States, and most creditably did she acquit herself on that occasion. Not only was there brought together one of the finest natural history collections of the Exhibition, showing the rich products of the chase, but mingled with it were illustrations of native customs and industries, and many valuable samples of commercial products, indicating the true resources of its present and future wealth, and there was sent with them a most admirable scientific and descriptive catalogue, drawn up by Dr. Mann, which was of itself a mine of wealth for the study of the botanist and zoologist. The large carved sideboard shown of native wood, with its accompanying maps and statistical and mineralogical charts, was of itself a credit to the colony and an index of its advance. The improvement of the harbour, the introduction of railways and steamers, machinery, and of British capital through the various companies which had been formed in London to promote useful undertakings, were all calculated greatly to benefit the colony. Already there were two or three staples of great importance, while, without doubt, many others would be developed before long. Besides producing sugar sufficient for local consumption, they were already able to ship this product to the Cape and to England to the value of £20,000 to £30,000 yearly; that, too, of as good quality as much of the Mauritius sugar. With increased skilled labour, and the full employment of machinery, much more might be done in extending sugar production. Cotton, too, was another important staple for which there were all the elements of success for the future in soil and climate. Stock trading and pastoral occupations generally would increase in future years; already the shipment of wool had increased tenfold in but a few years, and from the Free States in the interior large supplies might hereafter be looked for in favourable seasons. An extended trade would also arise with Delagoa Bay, Madagascar, and Mauritius, and hereafter the exports of the colony might be expected to bear a more equal proportion to the imports. In whatever point of view the colony was regarded, it presented a favourable aspect—the early difficulties had been got over—there was less of strong party feeling prevalent than in many other colonies, and the press, of which Mr. Robinson's journal was a most creditable example, was working energetically to advance the general interests of the colony.

Mr. R. HARWIN said, as a resident in this colony for ten or twelve years, he could speak on this subject from personal experience. He was personally acquainted with Mr. Robinson, and he could testify to the truthfulness of his character as well as to the accuracy of the statements brought forward in the paper. As a whole it presented a fair picture of Natal as it was. There were some matters in it which would have borne to have been am-

plified. Mr. Robinson might have given them a larger view of what was being done on the coast in the way of tropical production, as for instance, in sugar. He had stated that 45 mills were employed in the manufacture of sugar, at the same time he had not given due weight to the efforts which were put forth by the colonists to produce cotton. He (Mr. Harrison) had received information that this year a great deal of land in this colony would come under cotton cultivation; and there had passed through his hands, as consignee, cotton from Natal which was valued at 1s. 9d. per lb., and was pronounced to be the most suitable article for the Lancashire trade that had been brought into the market during the present depression. At the same time he thought Mr. Robinson had not given prominence to the difficulty of obtaining reliable labour. There was much in the observations of the Bishop as regarded the difference in value of the labour of the raw Kafir and one who had been trained at a missionary station, and that might be the case without disparagement to the labours of the missionary, because the native who came raw from the kraal had nothing to offer but so much brute strength, which he was willing to dispose of, and that was the most valuable commodity he could offer; whilst it might be that the native trained at the mission station had acquired some skill and entertained an exaggerated idea of his own importance, and on that account asked a higher price for his labour than the farmer thought it worth; but, at the same time, did not exhibit that amount of submission which the native did who came admitting his ignorance. There was one point referred to on which he thought the Bishop scarcely gave a fair view—that was as to what was being done in the way of educating the natives. He had stated that £5,000 per annum was reserved from the Government resources, but that not more than 5,000 people were receiving instruction. The result of his (Mr. Harwin's) experience was that, in his opinion, there was not a district in London, Manchester, or Birmingham, which was so fully supplied with labourers who were endeavouring to preach the Gospel as was Natal. Looking at the number of missionaries of various denominations engaged there, he thought that, taking the whole together, London itself was not so well off in regard to spiritual instruction as Natal and the Kafirs. As regarded the possibility of elevating the natives, there was no question about it. The letters read by the Bishop showed that the natives were capable of civilisation and intellectual growth. He was acquainted with stations in which there were large numbers of natives decently clad, who were not only capable of doing all the ordinary farm work in European style, but were also proficient in the common run of mechanical labour, such as building a waggon or making a plough, and house-building and brick-making were also performed by them. As regarded the fertility of the soil, the excellence of the climate, and the beauty of the country, there could not be two opinions. Those who had not trodden the shores of Southern Africa could form no idea of the wonderful beauty the country put on in early spring; and those who had visited this district from the Cape Colony—accustomed as they were to the sterility of that locality—were in transports of admiration on beholding for the first time the beauty of Natal. He knew from his own mercantile relations with the colony how much it was progressing. As regarded the production of cotton, it was undoubtedly increasing, and with respect to sugar, though it did not equal Mauritius in quantity, the quality of the article was fully equal; and he hoped soon to see Natal a large exporter both of sugar and cotton. The trade in wool was also becoming largely developed. The country had suffered very greatly from drought during the last three years, so that the recent tables did not fairly represent its actual progress. All things considered, Natal was not only a very beautiful country, but also a very hopeful one, and one which ought to attract a larger share of attention from those who were seeking new homes and fresh fields of labour.

The Bishop of NATAL said that he thought the last speaker had misunderstood his remarks as to what had been done for the education of the natives. What he said was, that he believed there were not more than 5,000 under regular instruction, though, no doubt, a much larger number came under missionary influence.

The CHAIRMAN said it now devolved upon him to perform the very agreeable duty of moving that a vote of thanks be given to Mr. Robinson for his paper. That paper contained a very interesting account of a very important, and, to them, almost unknown region. The writer had drawn a graphic picture of the beauties of the country itself, but, what was more important, he had given them valuable information as to the natives of the colony. He was sure they would agree that they owed much to the writer of this paper, who, he understood, was a distinguished member of the press in the colony; and it would be of importance to them, and of value to this country, to have information to the same extent with respect to our colonies in other parts of the world. It must be most gratifying to them as Englishmen to see their countrymen and language, their civilization and religion, extending throughout the globe; and he trusted their colonies would rise to that position which would enable them to govern and act for themselves. At the same time they must take care not to be too hasty in establishing for themselves that independence which no doubt they would ultimately attain. He could not sit down without expressing his own feeling of gratification, in which all present would share, at the highly interesting remarks made by the right reverend prelate, who had honoured them with his presence this evening. He begged to thank his lordship for the information he had given them. The Chairman concluded by proposing a vote of thanks to Mr. Robinson for his valuable and highly instructive paper.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 13th instant, two papers would be read; the first by J. L. W. Thudichum, M.D., F.C.S., "On the Collection of Excrementitious Matter, and the Application of it to the Benefit of Agriculture and the Relief of Local Taxation;" and the second, by the Rev. H. Moule, "On a System of Earth Sewage." On this evening C. Wren Hoskyns, Esq., Member of the Council, will preside.

Home Correspondence.

TWIN SCREW STEAMERS.

SIR,—In support of Capt. Symonds' admirable views on this subject, I beg to call the attention of the Society to the fact that in the year 1822 Mr. Jacob Perkins, among his other numerous inventions, constructed a screw steam boat or barge for canal navigation.

Mr. Perkins adopted the screw propeller, of course, in order to prevent injury to the canal banks; but stated as his firm opinion that it was essentially necessary to have two screw propellers revolving in opposite directions, so as to ensure the perfect action of the rudder. His screws were something similar to the ordinary smoke-jack fly, mounted on the same centre, one shaft being tubular, as in the dial-work of a clock, and made to revolve in opposite directions. A large body of the members of the Society attended to see the performance of Mr. Perkins's steam canal barge, which was quite satisfactory, considering, of course, the rude state of practical knowledge in those days.

I am, &c.,
HENRY W. REVELEY.

Reading.

To Correspondents.

Letters from Messrs. Dickes and Plumptre are in type, but are omitted this week for want of space.

MEETINGS FOR THE ENSUING WEEK.

MON. ...R. Geographical, 8½. 1. Arrival of the Expedition under Captains Speke and Grant at Khartum, on the Nile, from Zanzibar. 2. Despatches from Governors Sir H. Barkly and Sir Geo. Bowen —Landsborough's Traverse of Australia. 3. Lieut. Oliver, "On Madagascar."

TUES. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. 1. Discussion on Mr. Zerah Colburn's paper on "American Iron Bridges." 2. Mr. W. Watson, "On the Communication between London and Dublin."
Zoological, 9.
Syro-Egyptian, 7½. Mr. Marsden, "Some Remarks on the Coffin Lid of Men-Ka-ra, the Mycerinus of the Greeks."
Royal Inst., 3. Prof. Tyndall, "On Sound."
Anthropological, 7½.

WED. ...Society of Arts, 8. 1. Dr. J. L. W. Thudichum, "On the Collection and Utilisation of Excrementitious Matter, &c." 2. Rev. H. Moule, "On a System of Earth Sewage."
Graphic, 8.
Microscopical, 8.
Literary Fund, 3.
Archæological Association, 4. Annual Meeting.

THURS...Antiquaries, 8½.
Royal Inst., 3. Prof. Ansted, "On Geology."

FRI. ......Royal Inst., 8. Dr. Odling, "On the Molecule of Water."
Philological, 8. Annual Meeting.
R. United Service Inst., 3. Major F. R. Taylor, "On Military Surveying."

SAT.......Royal Inst., 3. Professor Max Muller, "On Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 24th*, 1863.]

Dated 15th April, 1863.

944. E. P. Colquhoun and J. P. Ferris, 1, Lawrence Pountney-hill —Imp. in fire-bars for the furnaces of steam boilers aud fire-grates.
946. W. Clark, 53, Chancery-lane—Imp. in apparatus for the transport of goods. (A com.)
948. A. Marriott, High-street, Higham Ferrers, Northamptonshire —Imp. in boilers for heating buildings, and in regulators for the same.
950. H. Eaton, Manchester—Imp. applicable to presses for baling purposes.

Dated 16th April, 1863.

954. J. B. Watts, Birmingham—Imp. in steel sword hilts.
956. I. Baggs, Cambridge-terrace, and W. Simpson, Tovill Upper Mills, Kent—Imp. in purifying and treating coal gas, sulphuretted hydrogen, and other gases containing sulphuretted hydrogen, and in obtaining sulphur, sulphuric and other acids in such treatment.
958. S. Moulton, Bradford—Imp. in apparatus or means for lessening the recoil of cannon.
962. F. A. E. Guironnet de Massas, Hoxton—Imp. in smut machines, and in machines for cleansing and peeling grain and seeds.

Dated 17th April, 1863.

968. R. H. Lawson, Victoria-terrace, Victoria Docks, and W. Darlow, Victoria-place, North Woolwich-road—Imp. in apparatus or means for obtaining motive power.
970. C. Turner, Alfredale Felt Mills, Hunslet, Leeds—Imp. in the manufacture of felted fabrics.

[*From Gazette, May 1st*, 1863.]

Dated 20th December, 1863.

5410. W. Perkins, Churchfield-house, Margate, Kent—Imp. in the manufacture of a substitute for turpentine, which is also applicable to the manufacture of varnishes, and to purposes to which turpentine is now ordinarily applied.

Dated 24th January, 1863.

218. E. Shackleton, Loth, near Ruysbrook, Belgium—Imp. in looms for weaving.

Dated 14th March, 1863.

697. W. Young, 77, Fleet-street—Imp. in type-composing and distributing machines.

Dated 20th March, 1863.

742. W. Reay, jun., Thropton-hill, near Rothbury, Northumberland —An improved machine for amalgamating minerals, and other metalliferous and metallurgical products or substances.

Dated 26th March, 1863.

789. G. Cowdery, Llanymynech, Shropshire—Imp. in machinery for making bricks.
791. N. R. Hall, Rosherville, Northfleet, Kent—Imp. in construction of weighing apparatus.
793. T. Parkinson and J. Wood, Manchester—An improved application of embroidery to cotton printed fabrics.
795. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in engraving upon metals. (A com.)
797. J. Norton, Bray, Wicklow, Ireland—Imp. in projectiles or ignition missiles.
799. F. Applegate, Bradford-on-Avon, Wiltshire—Imp. in railway carriage doors.

Dated 27th March, 1863.

801. J. Grantham, 31, Nicholas-lane—Imp. in apparatus connected with machinery used in manufacturing compressed fuel.
803. R. A. Brooman, 166, Fleet-street—Imp. in machinery for scouring wool. (A com.)

Dated 28th March, 1863.

809. A. H. Perry, Guildford-road, Brighton—Imp. in working railway points, switches, and signals, and in the apparatus to be employed for that purpose.
811. J. Leeming and R. S. Markindale, Broughton—An imp. in carding engines.
813. W. Symons, Hatton-garden—Imp. in barometers.
815. J. Dale, Manchester, G. Bischof, jun., Swansea—Imp. in the manufacture of aniline, napthylamine, and other analogous bodies, and in apparatus connected therewith, which apparatus is also applicable to obtaining finely divided metallic iron for other purposes.

Dated 30th March, 1863.

819. H. Hughes, Homerton, Middlesex—Imp. in machinery for shaping metal and plastic substances.
821. W. E. Newton, 66, Chancery lane—An improved process for producing yellow colouring matters and other colours, which may be derived therefrom. (A com.)
823. J. Payne, Kircudbright, N.B.—Imp. in fire-escapes.

Dated 31st March, 1863.

825. J. Smethurst, Royton, Lancashire—Imp. in steam engines and boilers, part of which imps. is applicable to heating purposes.
827. R. Furnival, Manchester—Imp. in and applicable to platting or braiding machines.
829. Lieut. A. H. Bell, R.A., Dover, and V. G. Bell, Woburn-place —An improved mode of constructing the armour of vessels of war.
831. E. O. Coe, Brook-street, Grosvenor-square—Imp. in propellers for ships and other vessels.
833. J. M. Dunlop, Manchester—Imp. in machinery for ginning cotton.

Dated 1st April, 1863.

834. J. S. Grimshaw, Huncoat, near Accrington—Imp. in carding engines.
835. J. Hindle, Sabden, W. F. Calvert, Enfield, and E. Thornton, Padiham—Imp. in looms for weavi g.
837. J. Bray, Stretford, Lancashire—Imp. in the construction of omnibuses, railway carriages, and other vehicles.
838. M. Henry, 84, Fleet-street—An improved metho of lubricating. (A com.)
840. W. West, Euston-road—Imp. in working railway signals.
841. W. Mitchell, Carlton hill-east, St. John's-wood—An improved process for coating iron. (A com.)
843. E. B. Wilson, 5, Parliament-street—Imp. in the manufacture of iron and steel and other metals, and in the apparatus employed therein.

Dated 2nd April, 1863.

847. E. F. Clarke, Holmer-road, Widemarsh, Holmer, Herefordshire—Imp. in the means of fastening rails for railways.
849. J. Cassell, La Belle Sauvage-yard—Imp. in stills for the distillation of petroleum and other heavy oils.
851. W. Jones, Liverpool—Imp. in the construction of ships or vessels, part of which imps. are also applicable for constructing buildings, and for various other purposes in which rolled iron is employed.

Dated 4th April, 1863.

855. A. Stewart, Helensburgh, Dumbarton, N.B.—Imp. in saddles.
856. J. Blain, Manchester—Imp. in the finish of threads and yarns.
857. P. Hanrez, Marchiennes au Pont, Belgium—Improved machinery or apparatus for drying coal, grain, and other substances.
859. W. H. Perkin, Seymour-villa, Sudbury—Imp. in the manufacture of red and orange colouring matters.
861. J. Gimson, Leicester—Imp. in the means of actuating shuttles in looms for weaving narrow fabrics.
863. P. Spence, Newton heath, near Manchester—Imp. in the manufacture of sulphuric acid and sulphate of iron.

Dated 6th April, 1863.

865. B. Cooper, Frome, Somersetshire—Improved apparatus for feeding, scribbling, or carding engines.
869. J. Railton and H. Booth, Blackburn, Lancashire—Imp. in machinery for carding cotton and other fibrous substances.

Dated 7th April, 1863.

873. H. Gilbee, 4, South-street, Finsbury—A new composition for dressing and preparing silk, cotton, and woollen tissues and fibres, and also mixtures of the same. (A com.)
877. J. H. Johnson, 47, Lincoln's inn-fields—Imp. in polishing precious and other hard stones, and in the machinery or apparatus employed therein. (A com.)

879. R. A. Brooman, 166, Fleet-street—Imp. in reproducing or obtaining facsimiles of the veins, pores, knots, and figures of wood upon paper and other surfaces. (A com.)
881. A. V. Newton, 66, Chancery-lane—Imp. in projectiles for ordnance, and in fuses therefor. (A com.)

Dated 8th April, 1863.

883. W. Simpson, Liverpool—Imp. in insulating the magnetic needle or needles in compasses.
885. J. N. Brown, Handsworth, Staffordshire—Imp. in securing or connecting the bearing springs of railway carriages and waggons to the axle boxes of the said carriages and waggons.
886. T. Gray, Lower Mitcham, Surrey—Imp. in preparing and bleaching jute and other vegetable fibres for spinning and other purposes.
887. J. R. Harris, Hawley-road, Kentish-town—Imp. in propelling vessels.
889. W. H. Mitchel, Hampstead—An improved construction of barometer.
891. A. Kinder, 20, Cannon-street—Imp. in coating or covering lead or alloys of lead with tin or alloys of tin, and in the apparatus employed therein.

Dated 9th April, 1863.

893. D. J. Cooke, Manchester—Improved compounds or compositions for sizing, stiffening and colouring yarns and textile fabrics.
894. T. T. Heath, Liverpool—The application of glass for ceilings and the like overhead parts of houses and other structures.
897. A. Hett, London, and F. W. Basset, Camberwell—Imp. in preventing the fouling of ships' bottoms, and in cleansing the same when fouled.
899. R. K. Penson, Ferryside, Carmarthenshire—Imp. in apparatus used in warming railway carriages. (A com.)
903. G. Low, Newark-on-Trent, Nottingham—Imp. in machinery for boring rocks and other hard substances.

Dated 10th April, 1863.

905. G. Colomb, Aigle, Switzerland—A process of manufacturing factitious blocks of wood of diversified shades and hues proper for veneering and other purposes.
907. T. Baldwin, Bury—Imp. in superheating steam, and in apparatus connected therewith.
909. H. R. Spicer, 3, Clement's lane, Lombard-street—Imp. in boxes or cases for the enclosure and preservation of human remains.
910. R. Smith, 10, Northampton terrace, Compton road, Islington—An improved medicated oil for the preservation of metal, wood, or stone.
911. J. Wightman and C. Dening, Chard, Somersetshire—Imp. in horse rakes.
913. H. W. Ripley, Montpellier-lawn, Cheltenham—Imp. in machinery for preparing and printing wool and other fibres. (A com.)

Dated 11th April, 1863.

915. F. Versmann, 7, Bury-court, St. Mary Axe—Imp. in moulding machines.
917. D. Mylrea, Church, near Accrington—Imp. in fire-bars or furnace grids.
919. J. Farrar, Halifax—Imp. in machinery or apparatus for twisting or doubling yarns of wool or other fibrous substances.
921. P. P. Baly, 4, Robert-street, Adelphi—Imp. in constructing breakwaters, piers, sea walls, and other similar structures.
923. C. A. Collins, Trowbridge—An improved method and apparatus for loading carts and waggons with hay, straw, and other similar products.

Dated 13th April, 1863.

925. J. Gill, Edinburgh—Imp. in printing machinery.
927. R. Leggett and R. Gittus, Mildenhall, Suffolk—Imp. in the construction of machinery or apparatus for cutting chaff and other agricultural produce.
928. J. Lark, White Lion Wharf, Bankside, Southwark—Imp. in the manufacture of artificial fuel and cement.
929. R. Reeves, Bratton, Wiltshire—Imp. in the manufacture of liquid manure drills.
931. M. Myers, Wigmore-street, Cavendish square—Imp. in the construction of trunks, portmanteaus, and boxes.

Dated 14th April, 1863.

933. J. Nasmith and S. Thornton, Manchester—Imp. in machinery for carding cotton and other fibrous substances.
935. G. T. Smith, Ordsall House, East Retford, Nottinghamshire—Imp. in metallic window shutters.
937. J. Combe and J. H. Smallpage, Leeds—Imp. in the action and arrangement of machines for winding cops; in the construction and arrangement of banks for holding cops for warping purposes; in the formation of shuttles for receiving cops; and for apparatus for packing and securing cops in shuttles, one part of which imp., consisting of a spring clutch, is applicable to machines in general.
939. H. Trapnell, Bristol—Imp. in vent pegs.
941. R. A. Brooman, 166, Fleet-street—Imp. in lamps for burning light and heavy mineral and vegetable oils. (A com.)

Dated 15th April, 1863.

943. J. Leach, Cheadle, Chester—An improved machine or apparatus for washing, squeezing, mangling, and churning.
947. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in the construction of gas burners. (A com.)
949. W. Spence, 50, Chancery-lane—Imp. in the manufacture of gunpowder. (A com.)
951. J. S. Morton, Northampton—Imp. in locks.
952. A. V. Newton, 66, Chancery lane—An improved construction of blowing apparatus. (A com.)
953. T. B. E. Fletcher, Birmingham—Imp. in apparatus for collecting the solid portions of sewage.

Dated 17th April, 1863.

964. S. Riley, Oldham—Imp. in the manufacture or preparation of cocoa and chocolate.

Dated 18th April, 1863.

972. C. W. Siemens, 3, Great George-street, Westminster, and F. Siemens, Birmingham—Imp. in furnaces which are principally applicable to the smelting of iron.
974. T. A. Weston, Birmingham—Imp. in ratchet levers.
976. G. A. Buchholz, Montague place, Clapham-road—Imp. in apparatus for hulling grain, and for reducing granular substances.

Dated 20th April, 1863.

980. G. Graham, W. Graham, and J. Graham, Burnley, Lancashire—Imp. in machinery for folding or plaiting fabrics.
982. J. Robey, Newcastle-under-Lyme—Imp. in apparatus for separating fluids from more solid matters mixed or combined therewith.

Dated 21st April, 1863.

988. E. L. Simpson, Bridgeport, U. S.—An imp. in waterproof compounds, and in fabrics prepared therewith.
990. M. Runkel, Hotel Sabloniere, Leicester-square—Imp. in marine steam engine governors. (A com.)
994. W. E. Newton, 66, Chancery-lane—Imp. in wrenches. (A com.)
996. W. Campion and G. Wilson, Market-place, near Sneinton, Nottinghamshire—Imp. in machinery or apparatus employed in the manufacture of looped fabrics.

Dated 22nd April, 1863.

998. F. E. Bryant, Alfred-street, Bedford square—Improved apparatus for ascertaining the temperature of steam, and its power of tension. (A com.)
1000. F. Durand, Paris—Imp. in moulding articles of china or other clay, or of other plastic materials.

Dated 23rd April, 1863.

1008. J. Whitley, J. B. Pope, and J. W. Burton, Leeds—Imp. in the manufacture of metals.
1010. W. E. Newton, 66, Chancery-lane—An improved mode of repairing worn out files and rendering them again fit for use. (A com.)

Inventions with Complete Specifications Filed.

1020. R. Lavender, 332, Goswell-road—A new compound to be used as a lubricator.—24th April, 1863.
1065. G. W. Fuller, Cambridge Port, Massachusetts—A new and useful or improved submarine lantern to be used in explorations beneath the surface of the ocean or any other large body of water.—28th April, 1863.

Patents Sealed.

[*From Gazette, May 1st*, 1863.]

May 1st.

2806. W. S. Kennedy.
2987. A. C. Dewies.
2993. R. A. Brooman.
2994. R. A. Brooman.
2995. R. A. Brooman.
3006. H. Griffin.
3007. W. N. Hutchinson.
3066. E. S. Cathels.
3112. R. Hardman.
3220. W. Clark.

[*From Gazette, May 5th*, 1863.]

May 5th.

1958. J. McGeary.
3015. H. Gardner.
3019. C. W. Spruyt.
3022. G. Kent and E. P. Griffiths.
3026. J. Whitaker.
3031. J. Shanks.
3035. G. F. Lyster.
3043. W. Galloway and J. Galloway.
3090. C. Littleboy.
3099. R. Brown.
3151. R. Hawthorn and W. Hawthorn.
3188. J. T. Caird.
3224. A. V. Newton.
3285. P. Todd.
3408. A. V. Newton.
3472. J. H. Johnson.
113. J. B. Rock.
447. F. J. Reed.
456. J. J. Badart.
618. W. Allen and W. Johnson.
631. J. Morris and T. Newton.
636. A. Wilson.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, May 5th*, 1863.]

April 27th.

1121. D. West.

April 28th.

1198. J. Denis.

April 29th.

1085. G. Masure.
1138. W. Evans.
1178. J. Chatterton & W. Smith.

May 1st.

1095. F. Preston.
1103. J. Gardner.

May 2nd.

1111. J. Brickhill and J. Noble.
1119. T. Heatley & W. Paddock.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, May 5th*, 1863.]

April 30th.

1095. F. Potts and T. Vann.

May 1st.

1033. R. A. Brooman.
1058. I. Holden.

Journal of the Society of Arts.

FRIDAY, MAY 15, 1863.

TWELFTH ANNUAL CONFERENCE.—NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The Twelfth Annual Conference of the representatives of Institutions in Union, and of the Local Educational Boards, with the Council, will be held on Friday, the 12th June, at Twelve o'clock noon. Sir Thomas Phillips, Chairman of the Council, will preside.

Secretaries of Institutions in Union are requested to forward, *as soon as possible*, to the Secretary of the Society of Arts, the names of the representatives appointed to attend the Conference.

The chairmen of, or representatives from, the Local Educational Boards are invited to attend. The representatives present at the Conference will be invited to the Society's Conversazione, which will take place on the evening of the same day, at the South Kensington Museum, and will receive their cards on application at the Society's House on the day of the Conference.

CONVERSAZIONE.

The Council have arranged for a Conversazione at the South Kensington Museum, on Friday evening, the 12th June, for which cards will shortly be issued.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following additional names have been received up to the 14th inst.:—

Caslon, Henry William	1	1	0
Jackson, Samuel	1	1	0
Redgrave, Alexander	1	1	0
Whitelaw, John	0	10	6

DWELLINGS FOR THE WORKING CLASSES.

With a view to promote enlarged investments of capital in model dwellings and other establishments for the benefit of the working classes, the Council of the Society of Arts has instituted a statistical inquiry into the results hitherto obtained, including family dwellings of every description, model lodging-houses, dormitories, refuges, baths and washhouses, soup kitchens, coffee-houses, &c.

Members and others who can supply information or indicate sources where it may be obtained, are requested to communicate with the Secretary, who will send blank forms for being filled up with the required data.

COMMITTEES OF REFERENCE.

MECHANICS AND ENGINEERING.

The Committee met on Friday afternoon, 8th of May, Sir Thomas Phillips, Chairman of the Council, in the chair.

The Chairman opened the proceedings by briefly explaining the objects for which the Committee had been invited to attend. In response to the circular issued by the Council, those present had elected to be placed in the important division indicated by engineering in general, machinery, the principles of architectural construction, models, shipbuilding, and naval matters. That was undoubtedly a very wide field, and all that could be done at this preliminary meeting would be to ventilate, in some shape, any subject or class of subjects which they might desire to have considered, and, if thought desirable, to place them in train for further more definite and more systematic inquiry.

Rear-Admiral Sir Edward Belcher said he thought one of the ways in which this Committee might be useful was in the formation of a list of subjects to which special attention should be directed. He knew it was the practice to print periodical lists of subjects for which premiums were offered by the Society, on which it was desired that papers should be communicated during the session.

Mr. Teulon would suggest the subject of the lighting of railway carriages as one which might be usefully considered by the Committee. Some time since they had a highly interesting paper and discussion in that room, in which the construction of railway carriages was incidentally touched upon. On that occasion he happened to differ from the writer of the paper, inasmuch as he did not think he was quite up to the present progress in railway construction. The Metropolitan Railway had recently been opened, on which a system of lighting the carriages with gas had been adopted. The same plan of lighting had been adopted on some of the longer lines, as for instance the Holyhead mail, and the mail between London and Dover, but as far as he had been informed, the methods employed were far from the perfection, which he thought was to be attained by the use of gas for these purposes. He would suggest that this was a subject which might be usefully selected for a premium. One point in particular he might mention, namely, that on the longer lines the gas was stored in one or two reservoirs, from which the lights in the train were supplied. Now it was clear that that was attended with inconvenience, because if from accident or other cause a train became separated, a portion of the carriages would be left in darkness, and the same inconvenience would be experienced in the case of the subdivision of trains on the journey. He believed in the case of the Metropolitan Railway each of the carriages, which were of very large dimensions, carried its own reservoir of gas, and he thought this was the best plan. Another point which might be usefully considered was the mode of burning fuel in locomotive engines. By modifications of those engines a large proportion of coal was now burnt, and those conversant with the subject would be aware that a given weight of coal could be used in place of the same weight of coke, at a saving of something like one-third of the cost. Great improvements had been made of late in coal-burning locomotives, but he thought further information on the subject might be usefully elicited. He believed the method was capable of still further improvement, for those who travelled behind coal-burning engines knew that they were occasionally incommoded by the large quantity of smoke emitted from them, which partly arose from want of proper care on the part of

the stoker. He begged to suggest these two points as being worthy of consideration.

Mr. Symons thought, looking to the present large consumption of the natural products of box-wood and ivory in many branches of manufactures, attention might be usefully directed to the finding of substitutes for those materials. He would suggest that a premium should be offered for the introduction of new products which could be substituted for articles which were getting scarce, and of very high price through their scarcity.

Mr. Bower, with reference to the remarks of Mr. Teulon on the lighting of railway carriages with gas, said he was at the present moment particularly interested in that subject — the Great Northern Railway Company having afforded him opportunities for experimenting in in that matter. He agreed that the chief defect with regard to the lighting on the Metropolitan line, was the employment of gas at the ordinary pressure at which it was supplied from the gas holder into the reservoirs. The plan, if he rightly understood it, was, that there was a large outlet from a gas holder at the terminus, from which the reservoir, placed at the top of the carriages, could be charged with gas as often as was required; but with trains running long distances—from London to Edinburgh—a very different plan was necessary. In cases where lighting by gas had been adopted on long lines, the plan was that of having a reservoir at the end of the train connected with the carriages by tubes running along the top. Any accident to one of the tubes would leave a portion of the carriages in darkness. The only effective way of lighting a train, in his opinion, and which he was endeavouring to carry out on the Great Northern, was, that each carriage should have its independent supply of gas—but it must be done under pressure. In Paris, the portable gas was supplied to the consumers from cylinders, into which the gas had been compressed, and it was carried about in waggons, precisely the same as gas was supplied in London some thirty years ago. The gas in those cylinders was compressed to from fifteen to twenty atmospheres, and in that form supplied to customers who were beyond the range of the main pipes; and it was delivered into their reservoirs at about five atmospheres pressure. The difficulty, then, in the lighting of railway carriages, was to regulate the gas from five atmospheres to that which was equal to a column of water 2½ inches high. Supposing they began with a reservoir containing 1½ cubic foot compressed to twenty atmospheres, that would give 30 cubic feet of gas, and if the gas were made from Boghead coal or petroleum oil, they would have gas of four times the illuminating power of ordinary coal gas, and burning 1 foot per hour they would have three times the light of ordinary gas, which would make 30 feet of such gas equal to 90 feet of ordinary gas, and this would be sufficient supply for the three lights of a carriage for six or seven hours. In his experiments on the Great Northern Railway, he was trying to get over the difficulties he had referred to, and he hoped to announce to a future meeting that he had succeeded in accomplishing it.

Mr. Christie said he apprehended this was not a proper occasion to discuss this subject in its details, but he would state that the carriages on the Metropolitan Railway were not supplied with gas from the ordinary gas holder, but it was delivered into the reservoirs at a considerable pressure, and was supplied to the holders by hydraulic pressure. By this means the reservoirs of the carriages were filled very quickly, and to regulate the pressure to eight-tenths of an inch head of water was a simple matter.

Mr. Cromwell F. Varley would refer to a matter of importance to Londoners in particular, and one which he thought worthy the attention of the committee. That was the protection of iron from rust, when exposed to the atmosphere. In his own profession he felt the effects of this very greatly in the neighbourhood of large towns, upon suspended telegraph wires, although that might be regarded as a small field for the use of iron. For the roofs of houses lead was generally used, but though it was expensive it was preferred on account of its non-oxydising properties. Considerable expense was also incurred in providing the necessary strength for supporting so weighty a material as lead. All attempts to use galvanised iron for roofs in large towns failed from the smoke attacking the galvanised metal, and tinned iron did not resist the action of smoke so well even as zinc. All the experiments he had seen of coppering iron had failed unless it was done in so expensive a manner as not to be practicable for any extended use of it. What they required was a covering of lead, or lead and antimony, put upon the iron so as to combine the stiffness and cheapness of iron with the durability of lead. Although this subject in connection with telegraph wires might not at first sight appear to be of any great importance, yet, owing to the multiplicity of those wires in the metropolis, the result might be that those who passed under them might be exposed to danger from the falling of long spans of wire through their being rusted away.

Col. Schaffner thought the subject introduced by Mr. Varley was one of considerable importance. He had noticed the coverings of houses in different parts of the world. In some countries they were of tinned iron. In America this was largely used instead of lead. In St. Petersburg and Moscow iron was mostly used, but it required frequent painting. In the telegraph service he had tried many expedients for the preservation of the wires by galvanising, and the use of linseed and other oils. He had boiled the wires in linseed oil with beneficial results; but they would decay. It might appear a small matter at first sight, but its importance would be recognised when they considered that there were now in use all over the world some half million miles of wires for telegraph purposes, and when they looked at the inconvenience which was occasioned by the interruption of the communication thus established. With reference to the lighting of railway carriages with gas, that was no new thing. He had seen it done in America, as early as the year 1849, on the New Jersey and Georgia lines; and he had no doubt they would be able to obtain information from the other side of the Atlantic, which would save them the trouble of inventing plans for overcoming supposed difficulties in that respect.

Mr. C. F. Varley remarked, that galvanised telegraph wires lasted very well when not acted upon by the coal smoke of large towns. Wires suspended in the country, and free from such influences had lasted for 16 years. It was only in the large towns that the iron required to be preserved.

Mr. Blackie remarked, that the preservation of iron and steel from oxidation was important in connection with the delicate works of watches and chronometers, which required great skill to preserve them from rusting. Another direction in which it was important was with regard to the injury machinery suffered from the action of salt water; also in scales and other delicate mechanism. He thought a paper of a practical kind upon the prevention of rust upon metals would be of great benefit to them.

Sir E. Belcher said in former times small arms were prevented from rusting by a simple process. The barrels were heated to such an extent as to burn stag-horn, which was rubbed over them, from which operation the old muskets received the cognomen of "Brown Bess."

Mr. Bower said, that in lubricating machinery during the last two or three years he had found that petroleum oil, while acting as a lubricator, preserved the machinery from rust. With regard to telegraph wires, he thought there was a difficulty in applying oil in the way suggested to metal. In Paris, he believed, a preparation of copper was used with the petroleum oils to protect metals from rust, the copper being deposited by electricity and then made into a paste.

Mr. Varley, sen., remarked that iron, being porous, and an absorbent of moisture, had a great tendency to

decay upon atmospheric exposure. If iron were heated and passed through oil, the pores were filled up, and the metal lasted a long time. That plan of preservation from rust was brought before the Society of Arts many years ago. The preservative effects of the operation were shown upon comparison after eighteen months with other iron which had not been so treated. He believed the application of linseed oil to iron would be found very beneficial, and he had no doubt good results would be found from its application in the case of telegraph wires.

Mr. REVELEY mentioned, as the result of his own experience, that iron heated and covered with asphaltum or mineral bitumen in the solid state had resisted a moist atmosphere for 15 years. He had found the natural asphaltum the best, and he had not succeeded so well with liquid asphalte. With all other materials he had found the rust penetrated underneath.

Mr. JOHN BRAITHWAITE said this was a subject of great interest to him, and he might say his experience in it had not been small. With regard to the observations as to the preservation of iron by painting, it depended entirely upon the way in which it was done. His experience dated as far back as the year 1806, when, as a boy, he was employed with his father in the operation of clearing away the wreck of the *Lord Abergavenny* from the spot where she had foundered. It was found that the salt water produced a very rapid oxidation upon the iron work of the tackle used in that operation, and the mode of arresting it adopted by his father, and which he had himself followed for the last fifty years, was by painting the iron with red lead. Painting with white lead was of no use, as the acid used in the preparation of it produced the swelling effects which had been alluded to. About a fortnight ago he had inspected a well a little way out of London, where he had fixed an engine forty-five years ago. The severe test in all these matters was wind and water. The rods which had been placed in this well, 200 feet deep, were painted with pure red lead, and on taking them up, he had the curiosity to weigh them, and he found that their weight was precisely the same as when they were put down 45 years ago. The same preservative effects of red lead were apparent upon other iron work which had been many years in use. With regard to the remarks of the gentleman (Mr. Bower) who was experimenting with the lighting of carriages with gas on the Great Northern Railway, he would say, that not only was the matter to which he referred not one of difficulty, but it had already been carried out. He (Mr. Braithwaite) had constructed a condensing apparatus for carrying gas about like soda water, compressed to 15 or 20 atmospheres. That apparatus was employed for olefiant gas. There was no necessity for the pressure of 15 or 20 atmospheres. All that was required was to fill bags placed on the top of the carriages, on which a certain weight was laid, which would thus give the necessary pressure. On the Metropolitan line each carriage had a separate reservoir of gas, and the sack thus weighted was sufficient to light the carriage for a short journey.

The CHAIRMAN then invited suggestions upon the next division of the subject, Naval Architecture.

Sir E. BELCHER said the subject to which he had been applying his attention, and on which on a future occasion he might be prepared with a paper was, the effective construction of ships of war, but not of iron, for he saw no necessity for iron vessels in the navy. He entertained the idea that he could construct wooden vessels with coppered bottoms suitable for war, and impregnable during the time of any action, and thus bring the old wooden ships into service.

Mr. D. K. CLARK said, reverting to the Metropolitan Railway, the chief consideration was to get a better mode of propulsion adapted to the circumstances of that line. The great object was to get a locomotive which did not make any smoke, and that could be done by carrying reservoirs of steam and hot water with the train, which would give off steam spontaneously for a certain length of time, or it might be done with compressed air. Another subject for consideration was the more general use of coal in locomotives, and consuming the smoke emitted. He agreed with Mr. Teulon that, although coal could be used without smoke being emitted, this was not carried out in practice. A still more important question was to reduce the price of coke, so that, assuming the evaporative power of coke to be the same as that of coal, if they could reduce the price of coke to that of coal, it would be much better to use coke. Coal had been introduced solely on the score of economy, but upon that point it was open to question, looking to the effects of the smoke upon the carriages and other parts of the train, involving a larger expense for cleaning and maintaining. He thought the direction in which the reduction of the cost of coke was to be looked for was in the utilisation to a greater degree of the gaseous products which were now wasted in the process of coke manufacture. They knew that the products of coal distillation were utilised in various ways. If they could preserve the gases and convert them to some useful purpose the price of coke would be greatly reduced. He thought these were legitimate subjects for inquiry by the committee. Another question for consideration was the reduction of the friction in the rolling stock, and the consequent reduction of the power necessary to propel it. Friction was a matter involving great cost, and under that head would be involved not only the construction of the carriages, but the lubricants employed.

Mr. BRAITHWAITE said, with reference to Mr. Clark's remarks upon the subject of engines for the Metropolitan Railway which emitted no vapours, this could be effected by means of compressed air, and, at the present moment, an engine was working the tunnelling apparatus at Mont Cenis, which would be applicable to the purposes of an underground railway. The Parsey engine was no doubt familiar to all present, and he (Mr. Braithwaite) had recommended it in the excavation of the great tunnel through the Alps. There was this great benefit from it, that it was a means of thoroughly ventilating the tunnel to its furthest extremity, and getting rid of all the deleterious gases that were generated. The ventilation of railway tunnels was a subject of increasing importance, and in the case of the Mont Cenis tunnel, the workmen employed breathed as pure oxygen as in the open air, and that which gave the mechanical power furnished a thorough means of ventilation. To show them how little regarded was the subject of lubricants, he mentioned that having heard of a new axle-box for the saving of grease which had been invented by a Frenchman, he inquired into it, and found that it consisted of the application of water in contiguity with grease, and was a most economical as well as effectual means of lubrication. He introduced the new axle-box to the notice of his brother engineers, and to several railway companies, but though it was shown that, by its use, half the consumption of grease would be saved in some cases, no notice was taken of the matter. He, however, obtained permission to put these axle-boxes upon carriages on the Great Western, the South-Western, and the South-Eastern. The axle-box was of the kind ordinarily used, but it had an outer casing in which water was allowed to mix with the grease when lubrication was wanted. He had fitted a set of these axle-boxes to a goods break carriage, on the London and North-Western Railway, in the month of September, and they continued in working up to the following April without any fresh grease having been supplied. Notwithstanding this manifest advantage in the saving of grease, the invention had been allowed to drop. As to the generation of steam, that was a matter which the committee would do well to consider. At present engineers were not satisfied with 16 feet of heating surface per horse-power, but they were trying for 25 or 30 feet; but if they got that surface they must have something to contain it. He maintained that a horse-power of steam might be got out of a foot of surface. He had illustrated that principle in his engine known as the

"Novelty," and in steam-navigation this was a point of great importance.

The committee then separated.

TWENTY-SECOND ORDINARY MEETING.

WEDNESDAY, MAY 13, 1863.

The Twenty-Second Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 13th inst., Chandos Wren Hoskyns, Esq., Member of Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Drake, Henry	24, Duke-street, Westminster, S.W.
Eales, Christopher	9, Welbeck-street, Cavendish-square, W.
Edney, William	38, Finchley-road, St. John's-wood, N.W.
Elliot, Russell	101, Long-acre, W.C.
Elt, Charles Henry	1, Noel-street, Islington, N.
Hammick, James Thos.	Census Office, Craig's-court, S.W., and 6, Winchester-road, Hampstead, N.W.
Roper-Curzon, Hon. H.	47, Argyll-road, Kensington, W.
Smith, W. H.	150, Leadenhall-street, E.C.
Taylor, John	Egremont-villa, Lower Norwood, S.

The following Candidates were balloted for and duly elected members of the Society:—

Dickson, Lieut.-Colonel Lothian Sheffield	10, Stanhope-terrace, Hyde-park, W.
Donaldson, Sir Stuart, Bart.	22, Rutland-gate, S.W.
Guthrie, Thomas Anstey	7, St. George's-terrace, South Kensington, W.
Maurice, Joseph	3, Langham-place, W.
Stansfeld, Josias Logan	Hersham, Surrey, and Reform Club, S.W.

The following Institution has been received into Union since the last announcement:—

Bolton, Mechanics' Institution.

There were two Papers read; the first was—

ON AN IMPROVED MODE OF COLLECTING EXCREMENTITIOUS MATTER, WITH A VIEW TO ITS APPLICATION TO THE BENEFIT OF AGRICULTURE AND THE RELIEF OF LOCAL TAXATION.

BY J. L. W. THUDICHUM, M.D., F.C.S.

When the House of Commons, in the course of last Session, resolved to appoint a Committee for the purpose of inquiring into "The best means of utilising the sewage of towns with a view to the reduction of local taxation and the benefit of agriculture," it proposed to re-open the inquiry into a matter which, as was evident from the Parliamentary Return on the drainage of the metropolis of the year 1857, had already been proved to be impracticable by the most ample analytical proceedings of men of science, and costly failures of private and public enterprise. To those, therefore, who were acquainted with all the bearings of the question, the result of the inquiry, so far as its purpose was expressed in its programme, could not for one moment be doubtful. To those, however, who believed that the inquiry could not be limited to the subject of its title, a way appeared open by which the object might be attained. This belief was founded on the conviction that the excrements of man are of the greatest value to agriculture; that by the present system of house and town drainage they are lost; that their removal involves a tax upon the community; and that by their discharge into rivers they pollute them and make them nuisances and sources of disease. The conclusions to which this conviction should have led all inquirers are of so simple a nature, and arrived at by so short and straight a way, that it is a matter of astonishment how they were missed by those who were called upon to give the results of their experience, or who volunteered their views.

The attempt to deal with the matter in question perished in the use of the word "sewage," just as the material which it was desired to preserve perished in the complex mixture called sewage. Sewage was assumed to be an unalterable entity, a decree of fate, from the very moment that those who proposed to deal with it lost sight of its real nature, as a foolish and shortsighted manufacture of man. The recognition of this error constituted the first step towards the only possible solution of this question; it led to the conviction that a return to first principles was absolutely required before the excrements of man could be utilized for either of the two laudable objects of the resolution of the Commons. As sewage contains nothing that is valuable for agriculture or any other human purpose beyond the excrements of men and animals, the inquiry of the Commons should properly have been into the best mode of utilising human excrements for the purposes indicated in the resolution. But this inquiry could not come before them, or occur to their mind's eye, unless another was previously instituted by them into the manner in which human excrements could be collected so as to allow of being applicable to any purpose whatsoever. Deliberation on this subject, however, became very difficult, owing to that false delicacy of modern society, which endeavours to remove such matters altogether from its notice, and through the very reasonable apprehension that any change in the present arrangement would involve expense and the abandonment of a comfort which all educated persons consider as a necessity of life; for the only alternative which was seen was between retaining the present closet and its apparatus, and returning to the cesspool just got rid of by legal enactments. The just abhorrence in which this inexpressible chamber, with its smells, its diseases, its contaminations of every kind, was held, left no doubt that all comfort-loving persons would pronounce for the retention of the hydraulic apparatus, even at the cost of an annual loss of five millions of value, and an additional expenditure of five millions of money for guano and artificial manure, and many millions more for the purchase of the grain and meat of other countries.

To a man who argues, as a common man would express it, by contraries; to that independent inquirer who investigates the circumstances which speak against his opinion, rather than those which appear in its favour—to such a man it must appear that the inventor of the closet-pan performed an experiment expressly for his use. Supposing him to have inquired into the intentions of Nature, and supposing him to have tested the logic of the question by trying how he could defeat the objects of Nature, he would immediately have fallen upon the closet-pan. But as men generally were not thus independent and thoughtful, their estrangement from Nature and her provisions could be effected by a gradual process of breaking their minds to the tolerance of loathsome places and of foolish processes for their use. First was erected the enclosure termed the privy; then came the wooden seat with the round hole in it; at first it was kept detached from habitations, until when the habitation was deprived of surrounding space, and became a town house, the necessary

room, with a cesspool attached, became part of the habitation. Then to guard his habitation from the contamination which he had himself necessitated, man flew to the water-closet, and robbed his field of its resources and nature of her due.

This was so little a result of unavoidable circumstances that, on the contrary, it must have involved a total forgetfulness of the oldest habits and laws of mankind. The Jews in the Desert had the spatula,* with which each man dug a hole for his fæces on the top of the declivity down which he had determined that the urine should flow. Thus was Moses great as the greatest of the givers or upholders of natural sanitary laws. The rediffs in the Turkish camp used, in the beginning of this century, to avail themselves of a similar arrangement. A hole was dug in the ground, and a tent was placed over it; slabs of stone formed a footing, and left a narrow canal between; the hole received the solid, which was immediately covered by a shovelful of the available earth close by. The fluid excretion ran by a narrow ditch to where it sunk into the ground. The proper working of the arrangement was insured by the vigilance of a sentry deputed for the purpose. Even the instinct of animals has taught reasoning man a lesson of cleanliness by the burial of their ordure. But neither from his ancestors nor from those whom he despised as inferior in what he called civilisation, nor from the brute creation, did the western man, the man of the Christian era, take example. At first he dirtied everything by what he cast from himself. He next removed pollution a little further from his habitation by sending it into his rivers; but, by a retribution of Providence, it turned back upon him in the water which he required for washing and drinking.

This state of affairs is recognised by all to be a matter of the greatest reproach to our generation; and, consequently, all would willingly remedy the evils if the means for doing so were but found. The subject is now no longer beneath the notice of statesmen, and industrious citizens even cater for the applause of vestrymen by flattering their hopes for cheaper bread and lesser taxes. Royal Commissioners have travelled through the land and taken notice of the cry of the populations—of the bills of disease and mortality, of the experiments of the industrious or the schemes of the speculator. The highest tribunal of the kingdom at last has recognised, by the appointment of a Committee of Inquiry, that the subject is of national importance, and is fully aware that it would meet with the unanimous support of the people in town and country if it were to encourage, by legal enactments, a feasible plan for escaping the reproach of recklessly throwing away what everyone knows must constitute the wealth of the nation.

We are now in possession of the final reports on these inquiries, and are fully able to estimate their shortcomings and their merits. Whatever may be the judgment of other persons upon their nature and results, in us they have produced the conviction that the purpose indicated in their title is still unfulfilled, that they contain no account of a proceeding in actual operation by which agriculture is benefited, or local taxation reduced, nor any suggestion by the carrying out of which those objects are likely to be attained.

The question is, therefore, open to original investigation, and as the result of such I beg to bring forward the following proposition.

By way of showing my basis, I must enunciate a principle which is, indeed, nothing else but the application to our subject of the principle upon which natural things must, at all times, be investigated. In inquiring into the best means of collecting human voidings, and applying them to beneficial and profitable uses, we must have the closest regard to the ways and objects of nature, to the mechanical arrangements by which she removes refuse matter from the human body, and to the chemical peculiarities with which she has endowed the solid part on the one hand, the fluid part on the other.

Nature separated these two excretions by propelling them in directions which diverge at an angle of 45 degrees, more or less. This arrangement makes it an easy task for a practical mind to adapt an apparatus to the necessities of man, and for man to adapt his position to the apparatus.

The separation of urine from fæces by means of an apparatus is, however, a very subordinate point in the main question at issue. By far the greater quantity of urine, among it that which is most important for the purpose, the night and morning urine, is passed at times and into vessels quite independently of defæcation. It may be said that five-sixths of all the urine passed is voided into chamber-pots and urinals, or might at least be voided into either of these receptacles with less trouble than into any other. One-sixth part of the urine at the outside is passed during the process of defæcation.

Nature then, by ordaining the discharge of urine at frequent intervals quite independent of defæcation, and by restricting the quantity discharged with defæcation to less than one-sixth part of the total quantity discharged, has imposed a kind of compulsion upon man to collect this excretion in a separate vessel. We at once perceive that the chamber-pot is a penny savings-bank, that the large amount of matter deposited daily therein must be collected and united to a larger capital, with which to fertilise the fields and secure the independence of agriculture.

Collection of the Urine.

The arrangements for this purpose, in the first instance, are such as to keep the urine uncontaminated by water, slops, or other impurities. All these should go directly into the place of their final destination, or take the intermediate route of the slop-pail. This purity once secured, the urine becomes a matter easily to be dealt with. It loses entirely the repugnant appearance and attributes which bad habits have associated with it; and what is of the greatest importance, it loses that aptitude to ammoniacal decomposition which the admixture of other matters readily engenders. This in its turn prevents the incrustation of vessels, which otherwise so easily ensues, and in this manner one step secures a series of consequences all favourable to our purpose, promoting domestic comfort, and diminishing household labour. The common slop-pail, for example, which through the almost unavoidable incrustation with lime-salts of the fatty acids from soap, and by the imbibing of this crust by ammoniacal substances, frequently becomes a nuisance on a small scale, is, by this means, converted into a clean and inodorous receptacle.

But as the contents of the vessels intended for the reception of the urine are emptied at least once a day, more commonly twice a day, and in some cases more frequently during the 24 hours, and as it would be very inconvenient to carry every vessel to the place where its contents are finally sent out of the house, it becomes necessary to employ a separate large vessel for collecting the contents of every smaller one of the house and carrying them therein to the place of egress. This larger vessel is of the shape and size of a common slop-pail, with a moveable sunk lid, serving as funnel and filter, with a spout for pouring out its contents, and a fixed handle at the side opposite the spout to hold it by during the pouring out the contents, and an arched moveable top handle for carrying it. This vessel may be termed the chamber-pail.

By means of this chamber-pail every householder has it in his power to cause five-sixths of the valuable fluid excreta to be collected, and to be further disposed of at his absolute will and pleasure. If he purchases a cask or an iron tank, and causes them to be trapped by the easiest means, so that no smell can be evolved by any chance, he may collect any quantity during any length of time he pleases, and at suitable periods either apply the contents of the cask or tank to his own lands, or sell them to

* Deuteronomy, xxiii. 12.

the agriculturist, to be disposed of by this latter according to his convenience. The householder can in this way, without any particular trouble in the course of each year, collect urine to the value in money of 10s. per head; from which it is evident, that the produce of the first year's collection in an average family of five persons would more than repay the cost of the whole apparatus, chamber-pail, cask, or tank, removal and application to the land. The farmer, on the other hand, would buy only what was really of value, as he could for a trifling sum ascertain to the utmost farthing the amount of matter valuable for his purpose contained in a given quantity of collected material. The second and all following years would return to the householder the full revenue of ten shillings per head of his household.

Of the daily urine passed by the inhabitants of London, a quantity of 2,900 tons, of a value of £2,838, could by these means be collected every day. The simplest arrangements, which need not exceed a few pounds in expense for every house, would enable the inhabitants of London to collect a value of a million pounds sterling per annum, without offence to their health, their noses, or even their feelings. The same holds good for every other town, or village, or single house; everywhere a value of ten shillings per head can be collected and returned to the land from which it was abstracted. Even if legal enactments could not be obtained for the plan, which I shall hereafter submit, for the collection in one spot of the excretions of entire communities; if no board of works could be moved to allow the sewers to perform their most valuable function, and assist in producing a return to the burdened tax-payer, even in that most improbable case, an expense of sixteen shillings for every house, sunk in the purchase of two carboys and a chamber-pail, would enable a society of private individuals to collect, with the concurrence of intelligent householders, value to a very large amount, and return to the householder, say one-half of the profits after deducting sinking fund on capital, interest, and cost of removal and application or transformation; and such half of the profits would in all cases amount to a considerable portion of the sewerage rates, and if every householder would do his duty fully, the whole amount of his sewers rates might be saved by his energy and industry.

But for towns provided with a system of sewers a much cheaper plan for collecting the urine of the population can be adopted, by providing a system of pipes, one from every house, which entering the sewer by the drain shall there be connected with a main, the main to meet its equals at the junctions of the sewers to combine with larger mains, and the whole to conduct their fluid contents to suitable stations in the course or at the outfalls of the sewers. At the stations or outfalls the urine might be collected in tanks, and carted away by road and rail, or lifted in stand-pipes, and sent to any distance by a system of conduits and reservoirs in the country, or be transformed into a concentrated, highly valuable, dry, portable manure. Even in towns where there are no sewers, or where only the smaller number of houses drain into the sewers, a system of pipes might be laid down and a profit realised upon the collection and removal of the excretions. Thus the town of Birmingham, which now expends upwards of £8,000 per year to clear the privies of its population of filth of little value, could by carrying out this proposition make an income of at least the amount of its present expenditure, possibly to the amount of £100,000, a sum still far below the theoretical value of the fluid excretion of its population.

The details of this proposed arrangement are no less simple than its general features. Excluding at present the consideration of the improvements which might be adopted in the construction and working of water-closets, we have only to provide one stationary outlet for the contents of the chamber pail. This is a funnel, leading to a pipe, of lead, bent in the usual manner so as to preclude the possibility of the regurgitation of any gases that might be evolved in its continuity. The funnel must be moveable, so as to admit of being cleaned by hot water. The pipe to which it leads must, moreover, in the better class of houses, admit of being closed by a cock or plug provided for the purpose. This funnel, termed the chamber funnel, conducts the urine through the bend into a small tank or reservoir, which can be opened occasionally for gauging the contents, and allowing the taking of a sample to test the purity and amount delivered. From this tank, which can be let off periodically, a half-inch pipe runs through the house drain into the sewer, there to join the main.

The main, which receives the pipes proceeding from the single houses, is an iron or stoneware pipe running along the wall of one side of each sewer a little above the mark of the ordinary dry-weather flow of sewage. The pipe is supported and fixed by cast-iron bearings let into the brickwork. It is somewhat egg-shaped on a section, with a flat and removable top-lid, which can be fixed water-tight, or removed in case any obstruction should require the interior of the pipe to be examined. The probability of the occurrence of obstruction in the main from calcareous deposit is very small indeed, and in portions where there is a rapid fall, closed round pipes can be used without hesitation. But as some engineers whom I consulted were apprehensive of incrustation, it is but right to take notice of their objections. The incrustation of common sewage pipes in the Fulham experiment has no bearing whatever upon the behaviour of uroducts in the sense here propounded. Sewage is alkaline; urine, acid; sewage contains lime-salts of fatty acids from soap, which adhere to any article they touch, and cause incrustation with great readiness, as can be learned by the observation of any slop-pail. The example of public urinals is also no guide towards a conclusion as to the effects of urine in the main. The urine is there spread over a large surface, and allowed to dry in part and to decompose. The earthy phosphates are thereby deposited and form incrustations by the crystallisation of the ammoniaco-magnesian phosphate. This retains decomposed urine, which acts as a ferment to all following portions of healthy urine. Deposit and ferment might easily be removed by the application of a little dilute nitric acid, mixed with some nitrous acid, and one daily careful washing. The main, so far as it is of lead or earthenware, can be freed from all deposit by the occasional application of some hydrochloric acid; the iron main would suffer by this agent, and when the most improbable case of its obstruction by phosphatic deposit should arise, might be cleaned by mechanical means.

The size and capacity of the mains must be calculated for every sewer according to the number of persons living in the houses draining into it. Supposing that the urine of the part of London north of the Thames were destined to collect in three mains, lying in the three intercepting sewers on the high, middle, and low level, a pipe one foot in diameter in each of them would admit of the gravitation of the whole of this vast quantity of daily excretion towards a common or three different receptacles, without there ever being any pressure in any of the pipes. But the possibility of such a pressure even can be provided against by a few perpendicular pipes rising from the top of the main, and admitting of the escape into the sewers of any casual excess of fluid.

As the main has to be fixed at the side of the sewer, where it would not obstruct the flow of the sewage, nor assist in the formation of deposits, and would also be out of the way of the persons who have to pass through or to work in those canals, it would be necessary to conduct the pipes from the houses lying on the side opposite to that side of the sewer along which the uroduct runs, across the sewer. This is best done in the form of an arch running along the roof of the sewer, and descending into the uroduct. As in the great majority of houses the level of the chamber sink would be above the level of the top of the sewers, this arrangement would offer no hydraulic difficulty.

Permanent Separation of Urine from Fæces.

There is an arrangement by which that part of the urine which passes during defæcation can be collected and united with the other five-sixths of the total quantity. It consists of a common water-closet, with merely a peculiar pan, being divided in two parts, an anterior one for the reception of the urine, and a posterior one for the reception of the fæces, in the usual quantity of water. The special arrangements for flushing with water both parts of the pan, and the proportions of those parts, must be left for special description, and are best understood by an inspection of a model or of the pan itself. Suffice it to say that the anterior funnel conducts the urine into a pipe, which, after having formed the usual ꝏ shaped bend, passes downwards along the large closet pipe, or coproduct, and in or near the drain joins the pipe coming from the chamber sink, or passes into the urine-tank. The posterior division is provided with a valve in the usual way, and washed with water in the usual way. An ounce or two of water only is provided for washing the anterior funnel of the uroduct.

This simple arrangement was indicated by me many years ago, as can be seen from its description in my work on the "Pathology of the Urine." It was also elaborated in France; and the water-closets of the building of the Exhibition of Paris, in the year 1855, were actually provided with it. The pans (terrines) worked exceedingly well, and there are many persons in London who can testify from personal experience as to their perfect success in the operation for which they were intended. A French chemist, M. Chevallier, obtained two prizes in the French exhibition for a similar pan. He did not, however, exhibit his article in the last London exhibition. A Swede however, a M. Klemming, from Stockholm, exhibited portable closets, in which the separation of the urine from the fæces is effected by a divided pan, the receptacle for the urine being trapped by a bent tube, and the aperture for the fæces by a valve, which opens when the person sits down upon the top ring, and closes when the operation is completed and the person leaves. Of this Swedish manufacture I possess a very excellent specimen. In the North it is generally known under the name of "Marino's closet."

Mode of separately Collecting both Urine and Fæces.

This arrangement for carrying out the intentions of Nature as to the separation of the fæces is, however, of much more importance in houses where no water-closets as yet exist, and the fæces and urine together pass into common receptacles, drains, or cesspools. Here the receptacles have simply to be divided, or two separate moveable receptacles have to be substituted—the one, a cask, a tank, or a carboy, to receive the urine from the uroduct; the other, a wooden box, a cask, or an iron box, to receive the dry fæces, dried further by the admixture of certain simple agents, inexpensive and within reach of everybody. The pan forming the funnel of the coproduct, is, in this arrangement, either provided with a valve at the bottom, or divided into two lateral halves, which open when a handle is pulled, and let the contents pass into the box below, whose cover opens by the pull of the same handle, and closes again when the pan closes and the handle is down.

The succession of the single steps of defæcation with this machine is as follows:—A conical paper bag made for the purpose is placed in the pan, or a paper spread over its bottom valves. A little dry earth, or a mixture of earth and lime, or of earth and gypsum, or of earth, lime, and gpysum, or of lime alone, is by means of a scoop from a common skuttle placed in the bag; the excretory process next deposits the fæces upon the earth, the urine being propelled into the uroduct. The operation, including deposition of papers, completed, another quantity of earth, or mixture of earth and lime, is thrown upon the fæces, whereby they are completely deodorised; the valve is drawn, the bag and contents fall into the box below; the valve closes, and all is finished. Those who are very particular can fix a small suction and pressure pump to flush the funnel for the urine with an ounce or two of water. It would perhaps be still better to have the pan made so that it can easily be removed and cleaned in a place where the water does not flow either into the coproduct or the uroduct.

The urine not touching the fæces, the amount of smell which rises from the fæces is not increased by the carriage of the steam which rises from the urine. The scybala are finally deodorized by matter, which being alkaline, combines with their mostly acid parts, and are preserved from decomposition by the substraction of moisture effected by the lime and dry earth. Both receptacles can be removed entire and fresh ones substituted, or their contents may be emptied into larger ones as often as may be requisite by the accumulation of matter, without difficulty, smell, or annoyance of any kind. The fæces and earth can be deposited upon any land, or in any dung-pit, upon any compost-heap, or be dug in or ploughed under the earth immediately; the urine, also, may be immediately distributed on land, or collected in tanks and reservoirs to await the opportunity of its direct use or its transformation into a portable manure.

The process here indicated is only the continuation of the process adopted by nature, and the agency employed is of the simplest and easiest kind, and its materials are either ready furnished by nature, or easily obtained by art in the largest quantities. The greatest difficulty, namely, the collection of the fæces without dirtying a receptacle requiring the agency of water for cleaning, is met by the adoption of a receptacle which may perish with the matter which it receives. Earth, moist or dry, or dried common earth, the most powerful hygroscopic substance known, surpassing even sulphuric acid and absolute alcohol in its affinity for water, is used to mummify the fæces, which at the same time are touched by lime to neutralise their acid properties and arrest their decomposition. The odour actually present is also absorbed by the earth, and the development of any further odour is precluded by the combination and dessiccation. This process is eminently adapted to satisfy the requirements of single houses in the country, of villages, and small towns. Many of the eleven-twelfths of the houses of Birmingham and Manchester not yet provided with water-closets, can apply this new apparatus at small cost, and sell the whole of the yearly proceeds at the rate of twelve shillings for every adult person. To the more densely-populated parts of larger towns, and the dense parts of London, this dry process is, however, at present not so applicable as the water-closet with the funnel and uroduct, and the chamber-pail and uroduct within the sewers.

The following tables prove by special calculations the correctness of my general propositions. The data of which they are composed are the best that the literature of science can afford, and are for the time complete. A few points could no doubt be ascertained more closely by renewed investigation, but, on the whole, the changes that could be effected thereby may confidently be pronounced beforehand as quite immaterial.

FIRST SERIES.—I. to XVI.

Showing the Physiological Qualities of Urine and Ingredients Discharged by both Sexes and Various Ages*:—

* E. A. Parkes, M.D., "The Composition of the Urine in Health and Disease," 1860. J. L. W. Thudichum, M.D., "A Treatise on the Pathology of the Urine," 1858.

TABLE I.

Average Daily Quantity of Urine passed by Healthy Adult Males between 20 and 40 years of age.

The number of days furnishing the mean is in no case less than six.

Observers.	Amount in fluid ozs.	Observers.	Amount in fluid ozs.
Prout	35	Valentin	50
Bird	38	Kerner	52
Schirks	38	Bischoff	54
Hammond	39½	v. Franque	54
Parkes	40*	J. Vogel	57
Becquerel	44	Beneke, 2nd observation	59
Lecanu	44	Beigel...	59
Roberts	46	Thudichum	61†
Schneller	46	Mosler	65
Genth	47	Jul. Lehmann	67
Kaupp	47	C. J. Lehmann	71
Beneke	49	H. Ranke	71‡
Neubauer	49	Boecker	81

Mean in 24 hours ... ... $52\frac{1}{2}$
Mean per hour ... ... $2\frac{1}{10}$

* Mean of 20 days' observation on one person (in London?)
† Mean of 163 observations on two persons in London.
‡ Mean of 30 observations on one person.

TABLE II.

Average Daily Quantity of Urea voided by Healthy Adult Males between 20 and 40 years of age.

Average of not less than six days each, often ten to twenty.

Observers.	Amount in grains.	Observers.	Amount in grains.
Becquerel	286·1	J. Vogel	540·0
Parkes	371·5	v. Franque	541·3
Beneke...	378·2	Bischoff	541·9
Scherer	416·8	Beigel	551·0
Lecanu	432·3	J. Lehmann ...	551·8
Moos	444·6	Mosler	558·9
Boecker	444·9	Rummel	563·6
Schneller	458·2	Kerner...	588·2
Scherer (2nd series)	460·4	Ranke	656·0
C. J. Lehmann ...	501·6	Hammond	670·0
Neubauer	511·2	Genth	688·0
Kaupp	535·1		

Mean in 24 hours ... ... 512·4
Mean per hour ... ... 21·0
Nitrogen ... ... 46·667 per cent.

TABLE III.

Average Daily Quantity of Uric Acid, Creatinine, Xanthine, Sarkine, Hippuric Acid, and other Matters Discharged by Adult Healthy Males of between 20 and 40 Years.

Boecker estimated the total of these at 247·6 grains.
Scherer ,, ,, 375·7 ,,
,, in a second case ,, 318·0 ,,
Rummel ,, ,, 236·7 ,,
Becquerel ,, ,, 180·0 ,,
Parkes, deducting volatile salts, uric acid estimates extractives at 154·0 ,,
These matters, in women of 15 to 40, 149·0 ,,

TABLE IV.

Average daily Quantity of Creatinine excreted by Healthy Adults.

Observers.	Amount in grains.
Thudichum	12
Neubauer	14·6 mean (9·2 min. 20·0 max.).

Nitrogen, 37·17 per cent. = 4·46 gr. which may yield 5·41 gr. of ammonia.

TABLE V.

Average Daily Quantity of Uric Acid excreted by Healthy Adult Males.

Observers.	Amount in grains.	Observers.	Amount in grains.
Neubauer (1st obs.)	4·32	J. Vogel	7·72
Beneke	5·40	Kaupp	8·01
J. Lehmann	6·11	Genth	9·35
Schulters	6·79	Ranke	10·00
Neubauer (2nd obs.)	7·56	C. J. Lehmann ...	10·80
Becquerel	7·64	Hammond	14·14
Boecker	7·64	Kerner	14·94

Mean ... ... 8·57

Nitrogen, 33·33 per cent. = 2·85 grains, which after putrefaction might yield 3·46 grains of ammonia.

TABLE VI.

Average Daily Quantity of Hippuric Acid excreted by Adults.

Observers.	Amount in grains.	
Liebig	9	"In about the same quantity as uric acid" (8·57).
Lehmann	9	
Weismann	34·5	when living on mixed food.
Ditto.	17·	when living on animal food.
Bence Jones, 1st indiv.	4·9	average of three days.
Ditto. 2nd indiv.	6·5	average of four days.

TABLE VII.

Average Quantity of Phosphoric Acid excreted by Healthy Adults in Twenty-four Hours.

Observers.	Amount in grains.	Observers.	Amount in grains.
Neubauer (1st obs.)	24·70	Sick	47·26
Dunklenberg (1st obs.)	32·94	Neubauer (3rd obs.)	47·86
Kaupp	35·46	Genth	49·33
Dunklenberg (2nd obs.)	35·62	Kerner	52·75
Mosler	36·48	Krabbe	52·85
Beneke	39·21	J. Vogel	54·04
Neubauer (2nd obs.)	39·94	Breed	57·62
Ranke	41·53	Winter (1st obs.) ...	57·92
Aubut	43·23	Winter (2nd obs.)...	65·13
Hammond	43·66	Hegar (2nd obs.) ...	71·63
Boecker	45·13	Mosler (2nd obs.) ...	75·81
Beneke	45·46	Winter (3rd obs.) ...	79·07
Hegar (1st obs.) ...	45·57		

Mean... ... ... 48·83

This gives for one million persons per annum 1,135·8 tons, value at £14 per ton (1½d. per lb) £15,902 12s.

TABLE VIII.

Average Quantity of Sulphuric Acid excreted by healthy Adult Men in 24 hours.

Observers.	Amount in grains.	Observers.	Amount in grains.
Becquerel	17·34*	Gruner	32·33
Parkes	20·67	Buchheim (2nd case)	32·50
Kaupp	21.03	Krause (2nd case)...	35·05
Beneke...	24·70	Boecker...	35·56
Krause (1st case)...	26·57	Kerner	38·26
Buchheim (1st case)	26·88	Neubauer	38·29
Duhmberg	28·85	Hammond	38·47
Neubauer (1st case)	29·79	Mosler	40·91
J. Vogel	30·88	Genth	41·14
Claro	32·02		

Mean ... ... 31·11

This for two million adult males gives 4 tons per day, value £37 6s., at 1d. per lb., or £9 6s. 8d. per ton.

* Probably too low, from loss during incineration.

TABLE IX.

AVERAGE QUANTITY OF CHLORINE EXCRETED BY ADULTS IN 24 HOURS.

Observers.	Amount in grains.	Observers.	Amount in grains.
Parkes (1st case)...	57·87	Neubauer	136·87
Parkes (2nd case)...	58·05	Wilde	147·60
J. Vogel	92.06	Hammond	154·80
Buchheim (1st obs.)	105·45	Kaupp	155·94
Buchheim (2d obs.)	105·60	Kerner...	156·71
Mosler	108·23	Hegar	161·96
J. Vogel	123·52	Beneke...	162.12
Bischoff	134·32	Genth	173·23

Mean ... ... 126·76
Corresponding to chloride of sodium ... 210·0

This, for one million men per year, gives 4888·3 tons, at ½ per lb., or 92s. per ton, has a value of £22,486.

TABLE X.

AVERAGE QUANTITY OF AMMONIA DISCHARGED BY ADULT HEALTHY MEN IN 24 HOURS.

Neubauer	12·8*
The same	9·5†
Boecker	6·48
Kerner	12·8
Mean...	10·52

* Mean of 12 experiments upon a man aged 30.
† Mean of 12 experiments upon a man aged 20.

TABLE XI.

AVERAGE AMOUNT OF POTASH IN URINE OF HEALTHY MEN.

Observers.	Quantity in grains.
Becquerel...	25·36*
Genth	107·17
Bœcker	40·5
Mean	58·2

One million men will therefore yield per year 1354·7 tons, value at £32 per ton, £43,350.

* This is probably too low, from mode of analysis employing incineration, by which potash is volatilized.

TABLE XII.

AVERAGE AMOUNT OF LIME AND MAGNESIA IN THE URINE OF HEALTHY ADULTS IN 24 HOURS.

Observers.	Grains of Lime.	Grains of Magnesia.
Neubauer	2·90	3·08
Duhmberg	6·36	4·21
Wagner	2·62	2·66
Genth	2·33	2·53
Mean	2·33	3·12

TABLE XIII.

AVERAGE QUANTITY AND COMPOSITION OF THE URINE OF 20 ADULT FEMALES BETWEEN 16 AND 40 YEARS OF AGE.

Observers.	Ingredients.	
Becquerel... } Lecanu ... Bischoff ... Mosler ... Beigel ... Ranke ...	Water	42 fluid ounces.
	Urea	390·0 grains.
	Uric Acid	7·3 ,,
	Chlorine	98·9 ,,
	Sulphuric Acid ...	30·2 ,,
	Phosphoric Acid ...	56·2 ,,
	Extractives, bases, and other ingredients ...	149·0 ,,
	Total Solids ...	731·6 grains.

TABLE XIV.

AVERAGE QUANTITY AND COMPOSITION OF URINE OF CHILDREN OF FOUR YEARS TWO MONTHS OLD, AND 31 LBS. WEIGHT.

Observers.	Ingredients.	
Scherer ... } Rummel ... Bischoff ... Lecanu ...	Water	23 fluid ounces.
	Urea	178·8 grains.
	Extractives and Volat. Salts	60·7 ,,
	Mineral Salts ...	186·9 ,,
	Total Solids ...	426.4 grains.

BOYS FROM 3 TO 16 YEARS.

Observers.	No.	Age.	Weight.	Urine.	Urea.	Na. Cl.
			lbs. avoir.	ounces.	grains.	grains.
Rummel } Uhle	4	3—5	30· 4	26·1	216· 0	123· 0
Mosler ...	1	6	34· 1	42·6	254· 6	101· 6
Scherer ...	1	7	49· 3	37·2	282· 4	...
Mosler ...	1	11	52· 8	61·3	328· 9	163· 6
Uhle ...	1	13	72· 0	26·6	290· 4	...
Bischoff ...	1	16	107·58	26·1	304·64	135·87

GIRLS FROM 3 TO 5.

Observers.	No.	Age.	Weight.	Urine.	Urea.	Na. Cl.
			lbs.	ounces.	grains.	
Scherer } Rummel Uhle	1 1 1	3 to 5	33	24·9	226·18	106·5

GIRLS FROM 15 TO 20.

Observers.	No.	Age.	Weight.	Urine.	Urea.	Na. Cl.
			lbs.	ounces.	grains.	
Mosler ...	1	16	72·6	56·5	355·12	115·8
Mosler ...	1	17	101·2	53·9	378·28	148·224
Rummel } Uhle ...	1 1	17 18	131·2	29·4	349·37	125·0

The quantities of urine and ingredients discharged by individuals of the same age of both sexes below ten years of age are equal.

Children of both sexes, under seven years of age, excrete almost double the amount of urea which an equal weight of adults excretes.

TABLE XV.

ESTIMATE IN ROUND NUMBERS OF FLUID VOIDINGS AND VALUABLE INGREDIENTS IN ADULT MALES AND FEMALES.

In 24 Hours.	Males.	Females.
	Avoirdupois.	Avoirdupois.
Water (Urine)	52 oz.	42 oz.
Urea	500 grains.	400 grains.
Uric acid	8·5 ,,	7·3 ,,
Creatinine	12 ,,	10 ,,
Hippuric acid	19 ,,	15 ,,
Phosphoric acid	50 ,,	55 ,,
Sulphuric acid	32 ,,	30 ,,
Chloride of Sodium	210 ,,	170 ,,
Ammonia	10 ,,	8 ,,
Potash	58 ,,	48 ,,
Magnesia	3 ,,	2 ,,
Lime	3·5 ,,	3 ,,

TABLE XVI.

ESTIMATE IN ROUND NUMBERS OF FLUID VOIDINGS AND VALUABLE INGREDIENTS OF MALES AND FEMALES, BELOW 20 YEARS OF AGE.

AGE 3 TO 5. Weight, 30 lbs.	Males and Females.
Water	25 oz.
Urea	200 grains.
Other organic and mineral solids	225 „

AGE 5 TO 10. Weight, 41·7 lbs.	
Water	40 oz.
Urea	270 grains.
Other organic and mineral solids	300 „

AGE 10 TO 15. Weight, 62·4 lbs.	Males.
Water	44 oz.
Urea	310 grains.
Chloride of Sodium	160 „

AGE 15 TO 20. Weight, 103 lbs.	Males.	Females.
Water	26 oz.*	46 oz.
Urea	305 grains	360 grains.
Chloride of Sodium	136 „	130 „

* One observation only.

SECOND SERIES.—XVII. TO XXI.

SHOWING THE AGES OF THE PEOPLE IN LONDON, AND THE NUMBER OF ADULTS TO WHICH THEY CORRESPOND PHYSIOLOGICALLY; ALSO THE AMOUNT AND VALUE OF THEIR URINARY VOIDINGS.

TABLE XVII.

AGES OF THE PEOPLE IN LONDON.

Ages of Males and Females enumerated April 8th, 1861.

ALL AGES.		YEARS.				
Both Sexes.	Males and Females.	Under 5	5.	10.	15.	20.
2,803,989	Males. 1,307,781	180,893	149,335	130,799	119,949	122,548
	Fem... 1,496,208	181,403	150,924	133,550	139,206	154,841

	YEARS.							
	25.	30.	35.	40.	45.	50.	55.	60.
Males ...	111,668	102,755	88,366	82,068	62,782	51,497	34,985	30,438
Females	140,367	122,012	102,151	93,832	71,408	61,231	43,202	40,878

	YEARS.							
	65.	70.	75.	80.	85.	90.	95.	100 and upward
Males ...	17,614	12,241	6,133	2,706	779	183	38	4
Females	25,322	18,862	10,061	4,821	1,615	412	93	17

NUMBER OF CHILDREN IN LONDON AT EACH YEAR UNDER FIVE.

SEX.	YEARS.				
	Under 1.	1.	2.	3.	4.
Males	42,262	35,588	35,602	34,344	33,097
Females	42,229	35,704	36,092	34,379	32,999

TABLE XVIII.

THE POPULATION OF LONDON CALCULATED AS ADULT MALES.

Total souls ... 2,803,989.

Males above 20 and below 60 ... 656,669.

Females ditto ... 790,044.

The fluid voiding of one female between 20 and 60, to the ditto of one male ditto is as 4 to 5.

$$\frac{790,044}{5} \times 4 = \text{males } 632,035.$$

The fluid voidings of 790,044 females are equal to the fluid voidings of 632,035 males.

Of the 84,491 children under 1 year, about one quarter will contribute about 8 oz. of urine per day. The rest will be lost. The amount collected will scarcely make up for the loss incurred through children 1 year and under 2 years of age. This class comprises 71,292 souls. Deducting probable losses, 5 children may be estimated to furnish the value of 1 adult male.

$$\frac{71,292}{5} = \text{adult males } 14,258.$$

The children 2 years and under 3 number 71,694, and may be computed to furnish value in the proportion of fluid to an adult male $\frac{71,694}{4} =$ adult males 17,923.

Of children 3 years and under 5 years of age, 134,819 are living in London. Their fluid voidings may be computed to equal those of half their number, or 67,409 adult females, and thus represent the value of

$$\frac{67,409}{5} \times 4 = \text{adult males } 53,924.$$

Of individuals of both sexes from 5 years upwards and under 10 years of age, there are living in London 300,259. Every 2 of these excrete valuable matter equal to 1 adult male. This represents a contingent of adult males, 150,129.

Of individuals of both sexes aged 10 years and under 15, there are 264,349 living in London. The excretions of every 5 of these may be estimated as equal to that of 3 adult males. This amounts to the produce of adult males, 158,607.

During the years from 15 to 20 the amount of valuable matter voided becomes larger, to the amount probably of one-seventh, in females than in males. Taking the average discharge of valuable matter in an individual in this category to be seven-tenths of that of an adult, then the 259,155 living in London excrete as much as

$$\frac{259,155}{10} \times 7 = \text{adult males } 181,405.$$

Between the age of 60 to 70 the quantity of valuable excreta falls ten per cent. below those of middle-aged persons. Of the 48,052 males of that age living in London, 4,805 will have to be deducted, leaving adult males 43,247

Of females of the same age (60 to 70) there are living in London 66,200. From these, for the same reason, 10 per cent. have to be deducted, leaving 59,580 middle-aged females to be placed into the account, which represent value of $\frac{59,580}{5} \times 4 =$ adult males 47,664.

It may be assumed that in persons between the ages of 70 and 80 the quantity of valuable matter excreted in the urinary fluids falls 20 per cent. below that of middle-aged adults. The 18,374 males of these ages living in London represent, therefore, middle aged males, 14,700.

The 28,923 females of between 70 and 80 represent 23,139 females of middle age, which

$$\frac{23,139}{5} \times 4 = \text{male adults } 18,508.$$

It may further be assumed that in people of from 80 to 100 years of age the quantity of valuable matter excreted in the urine falls 30 per cent. below that of middle age. Of males between 80 and 100, and upwards, there are living in London 3,710, which (minus 1,113) leaves middle-aged adults 2,597. The 6,958 females between 80 and 100 and upwards represent (minus 30 per cent., 2,085) 4,873 middle-aged females. These in their turn represent $\frac{4,873}{5} \times 4$ middle-aged males, $= 3,896$.

SUMMARY.

1 year and under	2	equal to adult males	14,258
2 years ,,	3	,, ,,	17,923
3 ,, ,,	5	,, ,,	53,924
5 ,, ,,	10	,, ,,	150,129
10 ,, ,,	15	,, ,,	158,607
15 ,, ,,	20	,, ,,	181,405
20 ,, ,,	60	males ,,	656,669
20 ,, ,,	60	females equal to males	632,035
60 ,, ,,	70	males equal to middle-aged	43,247
60 ,, ,,	70	females equal to males	47,669
70 ,, ,,	80	males ,, ,,	14,700
70 ,, ,,	80	females ,, ,,	18,508
80 ,, ,,	100	males ,, ,,	2,597
80 ,, ,,	100	females ,, ,,	3,896
			1,995,567

Taking into account that there are many thousand persons who come to London during the day, but sleep without (and are not enumerated as living within) the metropolitan districts, and deposit their fluid excretion in town, also many thousands of casual visitors; taking further into account the rapid increase of London, we are justified, I think, in assuming that the population of London excretes an amount of urine and valuable ingredients equal to that of 2,000,000 adult or middle-aged males.

TABLE XIX.

Amount and Value of the Fluid Voidings of the Population of London, calculated as 2,000,000 Adult Males.

Per day.

Urine, 650,000 gallons, or 2,901 tons 176 gallons.

Ammonia from urea, 36 tons (36·08), at £60 per ton, value £2,160.

Ammonia, from its salts............ }
,, ,, uric acid .... }
,, ,, creatinine .... } 2·9 tons, value £174.
,, ,, other nitrogenous matters .... }

Phosphoric acid, 6·2 tons, £86 16s.

Sulphuric acid, 4 tons, value £37 6s.

Chloride of sodium, 26 tons, value £122 16s.

Potash, 7·3 tons, value £233 12s.

Lime and magnesia, 1,714lbs., value 17s. 10d.

Total urine, 2,901 tons 176 gallons; and in this:—

Total solids, 84 tons, or 1 ton of solids in 34·5 tons of urine.

Total value, £2,832.

TABLE XX.

Amount and Value of the Fluid Voidings of the Population of London, calculated as 2,000,000 Adult Males.

Per annum.

Urine, 237,250,000 gallons, or 1,059,151 tons, 176 gals.

Ammonia from urea, 13,140 tons, at £60 per ton, value £788,400.

Ammonia from its salts, 465·5 tons, value £27,930.

,, ,, uric acid, 160·8 tons, value £9,648.

,, ,, creatinine, 251·8 tons, value £15,108.

,, ,, other nitrogenous matters, 200 tons, value £12,000.

Phosphoric acid, 2,271·8 tons, value, at 1½d. per lb., or £14 per ton—£31,805 4s.

Sulphuric acid, 1,489·5 tons, value at 1d. per lb., or £9 6s. 8d. per ton—£13,614 10s.

Chloride of sodium, 9,776 tons, at ½d. per lb., or 92s. per ton—£44,972.

Potash, 2,709·4 tons, value, at £32 per ton, £86,700.

Lime and magnesia, 625,610 lbs. (270 tons), at 1s. 8d. per lb., £325 16s. 8d.

Total urine, 1,052,151 tons, and in this:—

Total solids, 30,735·4 tons uncombined, being 1 in 34, or 3 per cent.

Value of each ton of solids, £34.

TABLE XXI.

Annual Value of the Fluid Voidings of the Population of London.

Summary:—

Ammonia ...	from urea ...	£788,400
	,, ammoniacal salts ...	27,930
	,, uric acid ...	9,648
	,, creatinine ...	15,108
	,, other nitrogenised matters	12,000
Phosphoric acid	...	31,805
Sulphuric acid ...	...	13,614
Chloride of sodium	...	44,972
Potash ...	...	86,700
Lime, Magnesia	...	325
	Total ...	£1,028,802

Value of 1 ton of urine rather less than £1.

Value of annual urine of one adult male, rather more than 10s.

The second Paper read was—

ON A SYSTEM OF EARTH SEWAGE.

By the Rev. H. Moule.

In a paper on the "Utilization of Town Sewage, which is contained in Vol. xxiv., Part 1, of the *Journal of the Royal Agricultural Society*, Mr. Lawes has written thus:—"No one will doubt that if the sanitary requirements of the nation could be attained by any system which would preserve the excrements of the population free from admixture with water, and present them for use at once undiminished in value by decomposition, and in a portable and innoxious condition, the land of the country devoted to the growth of human food might, by their application to it, be greatly increased in its productiveness. The question of the sanitary arrangements of our towns was taken up by our engineers before agricultural chemistry was much studied; and they have committed us to plans which, though they effectually remove the noxious matters from our dwellings, must greatly limit the area and mode of their agricultural utilization, and which, at the same time, have tended to the pollution of our streams. To say nothing of the enormous cost that would be involved in entirely subverting the present methods of removing the excrements of the inhabitants of our large cities from their dwellings, it must be admitted that no feasible scheme has yet been proposed by which this could be accomplished without the use of water. Such is certainly a great desideratum, but, perhaps, a consummation more to be wished than expected."

By thus placing this extract from Mr. Lawes's paper at the head of that which I am about to read, I would not lead to the expectation of any attempt on my part to prove that, for the removal of the excrements of the inhabitants of our large towns from their dwellings the scheme I propose is perfectly feasible. Such a proof, indeed, I am quite prepared to give; but so great is the array of prejudice, of self-interest, and, shall I say, of ignorance, against it, that, though I should establish my scheme beyond all contradiction, my proof would not, for any practical purpose with reference to our great cities, have, at the present time, the weight of a feather. It will probably require another half-century of experience to convince the public that the present drainage system, while relieving particular premises and special localities, is at the best but a shifting of an evil, increasing in its noxious character as it goes along from one spot to another, and that even the boasted and extravagant drainage of this metropolis is only a palliation and a temporary relief. The day will come, when, from the increase of the population higher up the river, an equal amount of pollution to that which is now to be withdrawn from it will be poured into the Thames; and

when, from the increase of filth, sand and rubbish poured into them, the main sewers, calculated for the present evil, will then be ineffectual for their purpose. There is only one observation which I would make on my scheme with reference to its application to large cities in which the water drainage now exists. Mr. Lawes says that the subversion of the present system in favour of any other would be attended with enormous expense. Now, in the establishment of the earth sewage system no public works are required, whilst the three-and-a-half millions being spent by the Metropolitan Board for the greater efficiency of the public works now existing, would have defrayed double the cost of all private works of the earth sewage system for London; and the manure saved instead of wasted would, on the very lowest estimate, have produced a clear income of £50,000 a year. But enough of this; I will proceed to state—

I. The principles of what I have ventured to call the system of earth sewage.

II. The mode of their application in closets, or commodes and urinals.

III. The provision of earth for single dwelling houses, or for large establishments, and for our smaller towns.

I. The peculiar adaptation of various kinds of earth for the complete and economical removal of excrementitious matter consists not in the mere fact that such earths are good deodorisers. This has long been observed and known. But it was not known until a very recent period that under certain circumstances the quantity of earth required for this purpose is very small. When the contents of a vault or cesspool have been allowed to ferment and generate offensive gases for months and years, it has been found that the proportion of earth required to destroy its offensiveness is immense. If, however, the evil be taken in detail, and the remedy applied at once, the reduction in the quantity required is incredible until tried. Three half pints of earth dried in the atmosphere and passed through a sieve with a mesh of one-eighth or one quarter of an inch, is amply sufficient for each use of an earth closet. It at once stops emission of offensive smell; it prevents fermentation; and these results are so complete and lasting, that either the same day, or after a week, or even a longer period, the mass of soil and earth can be removed from the room and the premises without any offence. If when thus removed a coarse sieve be used, the earth which passes through the sieve will in a day or two be dry enough to be used again, while all that which will not pass through, being thoroughly mixed together by a spade, or in any other way, forms a highly concentrated and inoffensive manure. Or if on removal the whole mass be thus mixed together and left to dry, it may with equal absorbing and deodorising efficacy be employed in the closet again. And so remarkable is this capability of earth for the absorption of such substances and gases, that I have myself subjected it to this repeated action ten times.

Here, then, in the case of a single closet is exactly that which Mr. Lawes requires. Indeed, if comfort and sanitary considerations be taken into the account, there is more than he requires; for together with the entire suppression of fermentation and of the escapes of noxious and offensive gases, there is here "the preservation of the excreta free from admixture with water; and they are presented at once undiminished in value by decomposition, and in a portable and innoxious condition."

II. As to the mode of application of earth in closets and commodes, it is obvious that it can in many cases be done without the use of machinery; and thus, in fact, it has been applied in not a few cottages, and amongst other public institutions, in the workhouse school of 55 children, at Bradford-on-Avon. A box of dry earth, with a scoop, is placed in the privy, and the children are required to throw in a scoopful on each occasion of its use. This has been attended with such complete success, that the Vice-Chairman of the Board of Guardians of the Bradford Union states, that where all before was "noxious pungency" there is now no offensive smell. And as to the quantity of earth used, he states, that from the repeated use of the same earth, the whole mass at the end of five months amounted to no more than 1½ ton, but that a mass of valuable manure.

It soon became clear, however, that in such cases self-action would be advisable, and in some cases almost a matter of necessity, whilst an application of the earth by machinery would be far more convenient, and might be more immediate than by hand. Accordingly, a very simple contrivance was tried for a time, which, however, soon in its use betrayed two or three defects, In consequence of these defects, Mr. James White, of Dorchester, applied his mind with much ingenuity and patience to a subject attended with far more and greater difficulties than any one who has not gone into it can conceive, and has produced in the patent earth closet of his manufacture that which, while almost equally simple with the former plan, obviates all its defects, and is, in my estimation, perfect. In its simplest form it may be thus described. At the back of the commode or closet is a box or reservoir filled with dry earth, at the lower part of which is a revolving hopper with four compartments, each of which is capable of containing the required quantity of earth. By a very simple piece of machinery the weight of the body in sitting down turns this hopper and fills the compartment with earth. On the person rising from the seat, the hopper revolves one quarter of its circumference, and throws the earth by means of a shoot directly on to the soil and under the pan. The same operation can, of course, be performed by the use of a lifting handle, and in this case the application can be instantaneous, an advantage which, in sick rooms and in hospital wards, appears to me to be incalculable. The excreta and earth together can of course be received in the case of a commode, in a bucket, or from a fixed closet passed through a pipe or shaft into a receptacle below, from whence its removal would be the most practicable. There is another form of closet, consisting of a set of knives in the form of a screw, which mixes the mass and at the same time cuts the paper to pieces, and forces the whole out in a perfectly inoffensive form. But the description of this I leave to the manufacturer. As to the use of earth in urinals no machinery is necessary, and its efficacy is complete. A truck or pit, eighteen inches or two feet deep, and filled with dry earth, occupies the space both under the standing place and three or four feet in front of this. The standing is formed of an iron grating, the continuation of the iron railing which forms the barrier. All offensiveness is thus prevented and a valuable manure produced. Public urinals on this plan in the metropolis, and in large towns, and at our railway stations, instead of the nuisances such urinals now are, might be completely inoffensive and innoxious, and might be made to pay. One ton of earth or of London clay would be sufficient for 1,000 uses, and dried at a temperature under boiling heat, might be used for the same purpose and with increase of value again and again.

III. In speaking of the supply of earth for closets, &c., I will take first the case of a detached house with a garden. All that I, in such a case, have to do is to take a few barrow loads of earth from my garden and allow it to lie for a time to dry. When used sufficiently in the closets, instead of being a loss to the garden, it is returned, as money borrowed, with interest. It has become a manure, highly concentrated, and so easy of application that a handful or two may be equal to a barrow-load of ordinary manure. This I have proved by many experiments. If from this we rise to a large establishment, say a barrack with two troops of cavalry, the same farmer who supplies straw for the horses, as soon as he sees the value of the human excrement, and can have the opportunity of removing it, will supply earth for closets. He will not grudge the earth from his fields, which is to be returned to him after a time equal in value, as it may be made, to superphosphate, or crushed bones, or guano. But if his

soil be light and thin, and he have clay in the neighbourhood, then he can easily and cheaply procure that substance, and if he mix it with such ashes as he can get, or with street sweepings, he obtains by the admixture a most valuable manure, exactly suited to his land. Or if, in the last place, we take the case of a town which, either is in such a position that it cannot be drained, or, the inhabitants of which, being unwilling to enter on the expensive, and now doubtful, system of water drainage, should be disposed to adopt the earth system, a company could provide, according to the circumstances of the neighbourhood, clay, peat, earth, silicate of alumina, or any other earth or sub-soil, except chalk or limestone, and adding to it, if they please, soot, or any other fertilising materials, they might send it with as much ease as they send artificial manure, to those parts of the country which manure prepared from any of those earths and substances would best suit. For instance, the manure of London, instead of being either wasted in the sea, or, not much better, wasted on a few thousand acres in the marshes of Essex, if mixed with the clay which is everywhere at hand, and with the soot and some ashes and street sweepings, might convert the sandy heaths to the west and south-west into fruitful pastures and cornfields. There would, in the one case, moreover, be no transfer as there is in the other, of the locality of malaria and offensive smell from the town to the country. And, whilst the whole neighbourhood of the Essex marshes will abominate the daily influx into those marshes of a lake of filthy slush, the most offensive part of that slush, freed from the water, and converted by the earth into an inodorous and valuable fertiliser, would, by the owners and occupiers of the heaths of Surrey, Hants, and Dorset, be not only welcomed but readily purchased.

DISCUSSION.

Mr. Alderman MECHI thought they must all agree that they were indebted to these two gentlemen for the valuable information contained in their papers, and they might safely congratulate themselves upon the progress that had taken place with respect to this question. Twenty years ago a man would have been considered almost foolhardy who would have ventured into such details on a question of this kind before this Society, but happily the spread of intelligence, and the necessity for producing food more abundantly and cheaply, had caused them to devote their attention more closely to this matter. If he rightly understood the question, Mr. Moule's principle was to bring the earth to the excrement, whereas Dr. Thudichum's was to carry the excrement to the earth; but both agreed that it was essential, for the fertilisation of the soil, that the earth and the excrement should be mixed together. He believed that it might be as much as half a century before the value of these suggestions was fully recognised, though no doubt, now that it was admitted that human excrement had a money value, it would in some way or other be made a source of profit. He was glad to hear from Dr. Thudichum a confirmation of the opinion he (Mr. Mechi) had expressed with regard to the annual value of the excreta of each individual. He was examined before the committee of the House of Commons last year on this subject, and he then expressed an opinion that the excrement of each individual in the metropolis with the other sewage matters, might be valued at about 16s. per head, but he was confronted by other evidence putting the value at only 2s. per head, whilst Dr. Thudichum had shown this evening that the urine alone of each individual was worth 10s. per head per annum, and the other portion would, of course, have a minor, but still a considerable value. As, however, it might be half a century before any such views as those advocated by those two gentlemen were generally adopted, they had in the meantime to deal with the question as it now stood. The Metropolitan Board of Works had nearly expended their £4,000,000, and had made those great channels for conveying to the Thames the excrement of three millions of people. He felt that such an intolerable nuisance and waste could not be long permitted, and it was with that question they had immediately to deal. He hoped the legislature would appoint another Committee to take evidence upon the utilisation and adaptation of that sewage, for there were still many points upon which we were still without reliable information. This was a most important ratepayers' question, for it was clear that the Metropolitan Board of Works were not at present in a position to dispose of that sewage, as the facts upon which an estimate of its value could be made were not sufficiently before them, and he had been told by one of the members of that Board, that hitherto the only offer made for the sewage, which had been estimated to be worth two millions a year, was £5 from one individual and nothing from another. Since then other tenders had been requested, and he believed some sealed tenders had been sent in, the opening of which were deferred for some two months. Any company that proposed to deal with that immense mass of matter must have very large means, inasmuch as if the mere conducting of this sewage to the Thames cost between three and four millions, the reconducting it to the land which required it would involve an expenditure which they could not deal lightly with. He said this much, because he believed the question was forcing itself largely upon the public mind. They knew that to feed the population of London alone required the produce of six or seven millions of acres annually, and when they considered that the consumption of food from that large area tended to the exhaustion of the land, and necessitated large returns of manure if its fertility was to be maintained, it was obvious that they must direct their attention to the economising of a material of so much value, and the prevention of such an enormous national waste.

Mr. VARLEY congratulated the Society on having brought forward this subject, because it was a great step towards returning to the original laws of health and cleanliness which were laid down by Moses for the ancient Jews. No other nation had such a code of sanitary laws as the Jews, and these we had entirely neglected. It seemed a most preposterous thing that we should send to the other side of the globe to bring away the accumulated deposits of birds whilst we had such an abundance of fertilising matter at home.

Mr. LIDDLE (Medical Officer of Health for Whitechapel) said there could be no doubt, from the experiments which Mr. Mechi had made, that there was considerable value in the sewage of London. In regard, however, to making alterations in the present mode of carrying away the excrement of such a large population as that of the metropolis, he was afraid it would be attended with great difficulties, owing to the class of persons they were brought into contact with, who had no idea of adopting those means which the Jews of old did, as recommended by their great lawgiver. In the first place, in London there would be difficulty in procuring the earth to be employed in the way indicated by Mr. Moule. They had no room to make use of such means, the houses were placed so close together, many of them not having even a back yard; therefore they were obliged to adopt the present system, namely, the conveying away the matter by the aid of water. He had known the district of which he had now the sanitary superintendence, for forty years, and he must say the improvement had been very great during that period, the system of drainage having been most materially improved. He was aware that they lost a large amount of material, proper to be applied to the land and capable of producing food. They now received large quantities of wheat from abroad, which, by the proper cultivation of the land, and the consequent increased employment of the population, it would be very desirable to produce at home. At the same time, there were many difficulties in the way. He considered the views put forward by Dr. Thudichum were impracticable in the present day, more especially the proposition of having two receptacles—one for excrement and one for urine, although it was true that in fifty years they

might alter their opinions and habits very much. There was another point which had not been adverted to. There were in London other matters which had to be dealt with, such as the refuse from slaughter-houses and cow-houses, which formed valuable manure. They had not been told in either of the papers how it was suggested to deal with these.

Mr. Freeman said the value of human excreta being, he apprehended, admitted on all hands, the point they had to discuss was, whether they could practically avail themselves of the two plans which had been suggested for the disposition of them. With regard to the plan proposed in Dr. Thudichum's paper, he thought the chief objection to it consisted in its extreme complication. It was, in fact, returning to Mr. Ward's old plan of having duplicate drains for every house; and he ventured to think, with regard to the system proposed in this paper, if it were laid before the public of the metropolis, it would be universally decided that the nuisance in every house would be so great, and the whole thing so complicated, that they would much rather sacrifice the pecuniary consideration than be encumbered with it. The sanitary consideration—which was the great object in view—appeared to be lost sight of in these propositions, more particularly as it concerned the metropolis. Would not the plan now advocated endanger the sanitary state of London? Would it not fill the houses with gases and odours that were anything but health-promoting? It appeared to him so complicated, and so likely to give rise to danger and difficulty, that he was inclined to think it was not what was required. The plan of Mr. Moule was certainly the more simple; but the great difficulty would be to get the poorer classes to understand it. Every time they used this apparatus they must be careful to take a sufficient quantity of earth to cover over the fæces; they must also have the earth dried and properly prepared for the purpose. It had been mentioned that clay could be used; but it would have first to be reduced to powder. He agreed with Mr. Liddle that all these various processes would take an immense amount of time and trouble, which, in his opinion, rendered the scheme impracticable. The Metropolitan Board were excessively anxious to solve the question of the disposal of the refuse matters of London. They had evidence as to the commercial value of the material, and public tenders for it had been invited. All the talent of our scientific men had been appealed to for some practical plan whereby this matter might be utilised. It had always been considered of value. His own idea was that the opinion of its value was going down rather than increasing. He recollected the time when it was said it would return an actual income of one million if it were properly utilised, but he was sure that high estimate was not put upon it in the present day. The great difficulty was to prevent its becoming so diluted with other matters as to render it valueless, and to maintain it in a sufficiently condensed state. These plans he thought were so complicated, requiring so much scientific knowledge, and so much time, that they could not be generally adopted, and if adopted, he believed they would not turn out well.

Dr. Gibbon (Medical Officer of Health, Holborn District), expressed his concurrence in the views of the last speaker upon the impracticability of the proposed plans in large towns. The Metropolitan Board had fairly met and disposed of the sanitary question, and the health of London had been improved immensely as compared with what was the case under the old system of cesspools, which was still maintained in Paris. The mortality of London was considerably below that of Paris at the present day, and considerably lower than it was 50 years ago; at the same time, he admitted that the value of the excrement wasted was very great. He should very much like to see this system carried out in the country districts, where the proper supply of dried earth could be readily obtained, and where ready means of disposing of the matter to the farmers of the locality existed. He thought the difficulties of introducing the system amongst town populations were insuperable. With regard to Dr. Thudichum's plan, he was sceptical as to what would be the results of this complicated system of pipes. He feared there would be constant obstructions in these uroducts, and the urine would become decomposed in the tanks, unless the atmospheric air was hermetically excluded. The coproduct he imagined would be an excessive nuisance, notwithstanding the lime and the earth, although he agreed that earth was the best disinfectant and the best absorbent when perfectly dry.

Mr. Clarkson concurred in the opinion expressed that the great objection to the plan proposed was its complexity. Anything beyond the most simple appliances would be attended with practical difficulty. Mr. Clarkson mentioned instances in which he had successfully disposed of large masses of excreta from establishments in this country, and also in Paris.

Mr. Plum remarked that the only question on which there was any difference of opinion was the practicability of adopting either of the two proposals submitted. One objection he looked upon as insuperable, that was, they had proceeded too far on a bad and unsound principle, and they did not like to retrace their steps. There was no question in his own mind that either of those proposals might be carried into practical operation. He believed the ingenuity of men quite sufficient to provide for all the practical difficulties which stood in the way, just as the practical objections to the main drainage of the metropolis had been overcome by engineering science. He could confirm the experience of the gentleman who had spoken with reference to the necessity of dealing with the sewage matter in detail, and he (Mr. Plum) contended before the Commissioners of Sewers, fifteen years ago, that the great error was in the wholesale mode of dealing with the sewage. If they dealt with it in detail, in small quantities, it would be well, but they could not deal with it on the enormous scale which was now attempted, looking at the large admixture of foreign matters which rendered the sewage of London almost valueless. In some cottages he had built in the country he had introduced an arrangement for covering the excreta with the coal ashes made in the houses, and he found by that means a valuable solid compost was produced, which was readily disposed of to the farmers, and he had no doubt in agricultural populations the plan proposed by Mr. Moule could be adopted with great advantage, notwithstanding it was probable that a large amount of prejudice would have, in the first instance, to be encountered. But he hoped for better times, and that they would yet see the day when the signal failure for which we were now paying so dearly, would be remedied.

Mr. B. H. Paul said the propositions contained in the papers read might be considered as a confession of error on the part of those who insisted upon the utilisation of sewage, under the existing system of water carriage. The proposed return to a method of disposing of excretal refuse, without the use of water, was not very likely to find favour in a sanitary point of view, when compared with the advantages which, in this respect, the water carriage system undeniably possessed, so far at least as the condition of dwellings was concerned. But the object with which the dry system of sewage was proposed, was less of a sanitary than of an agricultural nature, and, like the suggested application of sewage to agriculture, had originated almost entirely from views put forward by Baron Liebig with regard to the conditions determining the fertility of land. It had been argued that materials indispensably necessary for the growth of corn were abstracted from the soil, and that, as corn was consumed as food, they eventually passed into animal excrements. Hence, it was urged that these waste materials had an agricultural value, that the present mode of disposing of them was a waste and a serious loss, and that the result to which it would lead was the exhaustion of land to a condition of entire sterility. Whatever truth there might be in these views, it was not the less certain that to induce people, for these reasons, to

acquiesce in a change from the water carriage system to the dry sewage system, involving so much questionable excremental manipulation, the arguments in favour of the views just mentioned must be very strong, and, even if it could be shown that they were correct, it still remained a question whether the removal of excremental substances, with a view to their use as manure, could be best effected with or without water. The arguments that had been brought forward in support of those views were various; among others, the customs of the Chinese and the Japanese had been dwelt much upon, but it would seem that those customs owed their origin more to sanitary than to agricultural considerations. The apprehensions that had been expressed as to the possible future exhaustion of soils, in consequence of the present mode of disposing of excreted substances, appeared to have been much exaggerated, and it was a question whether they did not originate from a too limited view of the matter. Apprehensions of a similar kind had been at various times put forward. Thus, for instance, about two centuries ago, it had been declared that there would soon be no fuel left to make iron with, in consequence of the exhaustion of the forests. Such an opinion seemed correct from the limited point of view whence the subject was considered, but from the more comprehensive view that might be taken of it, it seemed absurd. In all natural operations with which they had any intimate acquaintance, there was recognisable a principle of conservation; consumption and restoration compensated each other, and though, in some cases, the way in which this compensation took place was not recognised, there was not the less reason for regarding it as universal. Even in supplies of material productions, when one failed another was found to take its place, and to give rise to new and more important branches of industry than that which had been worked out. So in agriculture, we might with reason depend upon a continuance of such conditions as had already been found to afford a means of maintaining the fertility of the land.

The Chairman said it appeared to him that it was very important that the question, as had been remarked, should be as carefully looked into as possible, because the general question of sewage had been discussed so largely, and gone into so fully, that it would be beside the present purpose to go into it again, but they would do better to confine themselves definitely to the two proposals contained in the papers. With regard to that of Dr. Thudichum, it appeared that the separation of the liquid and solid did not solve the difficulty in so simple a manner as the plan described in the paper read by Mr. Moule. What appeared to be required was to deal in detail with the substance instead of committing it to the commixture of liquid from the rainfall, or the supply of water in the metropolis by the river companies and other sources, which placed it out of the reach, not only of the agricultural, but also of the commercial community, and likewise, to some extent, failed in a sanitary point of view, because, though water was to a great extent an absorbent, it did not retain the gases evolved from the sewage; and where the discharge was made into a tidal river, there was a liability of the sewage matters being brought back again in an offensive form. In dealing with excreta by means of earth, they did in fact return to the natural process. It was known that the power of clay as a deodoriser was much increased by subdivision, and a very small quantity produced the desired effect. Therefore, it ought to be considered as an important feature in Mr. Moule's plan, that the small quantity of earth required in a dry state presented less difficulty under many circumstances than the supply of water; and he apprehended the first proposer of the water-closet was exposed to all the objections that could be raised on the score of difficulty and complication. With respect to the supply of earth in the country there would be no difficulty, but the question was how the case could be met in the metropolis and large towns. It was not uncommon to refer to China and Belgium as instances of the use of liquid forms of manure; but the whole question was one of climate, and in the western parts of England the climate was so moist, as compared with the eastern, that the same principle that would succeed in the east would not succeed in the west. The rain-fall was also an important element in the question of the application of manure, whether in a liquid or in a solid form. With regard to the separation of the liquid and solid manure, it should be recollected that guano, which was the best manure, was voided in a mixed form. This manure of birds, where there was no separation, was the most valuable; and that appeared an additional recommendation of the system which placed both substances together. The whole subject, however, was one surrounded by difficulties, and they had good cause to be obliged to these gentlemen for the patience and scientific research they had bestowed upon a matter, always a difficult one, but which, as Mr. Mechi had said, would probably be less difficult to deal with as civilisation advanced. Not only was it important as a sanitary question, but also as a chemical and agricultural question. He trusted the subject would not end here. The proposals in their present form might not be practical or feasible, but every application of an ingenious mind to a subject of this kind was welcome and valuable. They might hope that in the future some means might be found by which the concentrated population of large towns might deal as well with this question as the more widely-spread population of the country districts, so that, eventually, the great law of nature might be satisfied, which made it apparent to every one that the fertilising of the earth ought to go hand-in-hand with sanitary considerations. The Chairman concluded by proposing a vote of thanks to the gentlemen who had contributed these interesting papers.

The vote of thanks having been passed,

Dr. Thudichum, in reply, said he had intentionally not entered upon the question of agriculture and exhaustion of the land, as all that could be said on that head was generally acknowledged, or capable of the easiest proof. The fertility of the land in ancient Judea, in China, and Japan, was maintained by the application, without the intervention of water, of human excretions to the soil. The Chinese had no notions upon this matter approaching the sanitary theories of Europe, but acted with common sense and with a view to profit. Regarding the allegation that his plan would produce nuisance, and interfere with the proper working of the sewers, he should certainly blush if such an imputation could be brought successfully against him, for he claimed to be a physician and a chemist. He would not have ventured to bring it forward did it not meet all considerations that could be urged, domestic cleanliness and comfort, public health, reduction of taxation, improvement of the means for carrying on the cultivation of the fields, purification of rivers, and improvement of drinking water, particularly that derived from rivers such as the Thames. The plan was, however, by no means devised for London only, but was applicable to the greatest variety of places. He was glad that gentlemen had promised that everybody would be of his opinion fifty years hence. The march of intellect and the necessities of agriculture would not, however, wait for those gentlemen, for guano, upon which they now depended, would be exhausted in thirty years, and what was England to do then? They would have to go to those sources which ever flow, and which can never be exhausted; they would have to collect human excreta somehow, whether by complicated means or by simple means. They would then obtain the best manure, which was not guano, but human urine, containing, as it did, all the ingredients of a manure necessary for the production of wheat and of meat. Guano was deficient in potash, and when brought upon land, also deficient in potash, would simply exhaust that land, as it had already done in numerous instances where farmers had abandoned the use of this manure. This exhaustion could never occur if human urine were applied. Indeed, if London

were to collect the whole of its urine, it could therewith manure a sufficient area of land to produce thereon the whole of the grain and meat which it consumed, and it could do so for every year, and for ever. He had another assurance that science would prevail before another fifty years of neglect had made the soil still poorer than it was. The chief magistrate of Stockholm had to deal with the sewage of that town, and had commissioned a chemist, Professor Müller, to investigate the subject. This gentleman had arrived at exactly the same conclusions as himself. He had published his report in March last, whereas he (Dr. Thudichum) had sent in his paper to this Society last autumn. The results of both were therefore arrived at quite independently of each other, which was a great guarantee for their value. In Stockholm, and the other northern towns, a closet with a divided pan, known under the name of Marino's closet, was no novelty. Professor Müller had stated that in each of those towns many thousand closets of that kind were in actual operation, and that their use was daily becoming more common. It was, then, to be hoped that Stockholm would set an example which London might follow, if other towns in England, such as Birmingham and Brighton, would not prefer themselves to set the example. In Belgium the use of human excretions was well understood. In Baden it was rapidly becoming appreciated. The Governor of Rastadt had caused the excreta of the garrison to be collected. In the first year it realised a profit which, in subsequent years, rose from a few hundred florins to 3,000, and last year to 8,000 florins, and would no doubt rise to three times that amount. This example should stimulate us to do something similar in our barracks, camps, hospitals, workhouses, and other public institutions, where great numbers of persons were kept at the expense of the community. It was a reproach that the camp at Aldershot, which might return a value of many thousand pounds per annum, should cost the country £1,200 per annum, fruitlessly spent for the removal of valuable matter. It had been stated that the Board of Works were most anxious to get the value out of the sewage of London that it was alleged to contain. But they wanted an exceedingly simple plan, and a member of the Board had termed his (Dr. Thudichum's) plan not sufficiently simple. This was a question of dealing with given laws of nature, and no preconceived demand for simplicity would ever solve it. The excretions had to be collected, to be made portable, and to be carried to the land, at the smallest cost. These demands he claimed to have satisfied better than any previous plan had ever done. Mr. Plum had truly said that there was no practical difficulty in the way of its being carried out, and the only impediment was in men's minds. Some speakers were possessed by a vague idea that the sewage of London could be distributed over a large area of land, and spoke as if no experiments had been made, and no inquiry carried on. He held in his hand the Report to Parliament on the Main Drainage of London, made in 1857. It contained evidence on the experiment which was made by a company in the Fulham-fields. The sewage of the south-western part of London was carried there in a sewer specially built, and distributed over the fields by means of pipe and hose. The company at first gave the sewage away, and it was used experimentally. But the gardeners and farmers found that it was of no use, and did not repay the cost of distribution, and would not have it even as a gift. The company lost £40,000, and when they took up their pipes they found them almost or entirely closed by an incrustation, caused by the deposition of the soap-and-lime compound contained in sewage. Now, if they distributed the sewage of London, and spent forty millions upon the attempt, they would lose their money as the Fulham Company had lost their forty thousand pounds. He appealed to the intelligence and goodwill of his audience and of the community to abandon chimerical ideas, and to consider and try the matter by the light of science. He was, from experience in other scientific contests, sufficiently aware that every new proposition did not usually meet with consideration, but contradiction, and that from those who acknowledged that they had no experience of their own on the subject. But he was satisfied to have stimulated inquiry, and he begged those present to give to the subject their most earnest consideration, and he had no doubt that some such plan as he had proposed would be carried out and the undertaking be crowned with success.

Rev. H. Moule would only detain the meeting a few moments to say that many of the objections which had been raised against Dr. Thudichum's plan he took to apply equally to his own. He did not complain of the very fair criticism which had been passed upon these proposals. He thought people had a right to exercise their judgment upon a matter so novel; and no one who had not seen the simplicity of the operation of the closets he recommended would believe it. He had not brought before them a mere theory, but the actual result of five years' experience of the deodorising effects of earth upon fæces. He resided amongst a poor population, and he had been driven, as it were, to this discovery by the wretched provision of the cottages in his own neighbourhood. He had tried various contrivances to relieve the difficulty, until at last, as if by accident, he had lighted upon the present arrangements he had described. The repeated action of the same earth reduced the quantity necessary very considerably. Mr. Moule mentioned cases within his own knowledge in which his plan had been carried out on an extensive scale, and also the favourable results obtained upon crops by the application of the compost formed to land in his own neighbourhood. He added that he had throughout disclaimed having anything to do with London, or towns where there were water-works. But his field of operation was vastly wider than that. He contended that the Board of Health too much overlooked the country districts. The cottages were detached, but wholly undrained, and the rate of mortality was higher in some of the rural districts than in London. He knew one village in Dorsetshire where the rate of mortality during eight years had been 33½ per thousand, as against 17 per thousand in London.

The Secretary announced that on Wednesday evening next, the 20th instant, a paper by Mr. B. H. Paul, "On Destructive Distillation, considered in reference to Modern Industrial Arts," would be read.

Home Correspondence.

THE SEWING MACHINE.

Sir,—May I be allowed to ask how it happens that this beautiful machine has from the first been only applied to the more complicated and ornamental departments of the business of the seamstress; and not to the simple operation of sewing two selvage edges together, which, when done by hand, is close and flat, in fact, not to be easily distinguished from other parts of the fabric.

I also beg to inquire why it is necessary for the machine to consume at least three times the quantity of thread ordinarily used in hand sewing, besides lost ends and other waste, and in addition making a clumsy thickness compared with handwork seaming.

I am further given to understand, that sewing machines cause a higher rate of charge to be made than is usual for sewing or seaming performed by hand.

Until these objectionable qualities be removed, it is impossible for this model of man's ingenuity ever to become a really useful domestic machine.

I am, &c.,
HENRY W. REVELEY.

Reading.

AUTO-TYPOGRAPHY.

Sir,—I really am not confounding glyphography and nature-printing, as Mr. Wallis supposes in his courteous rejoinder, printed in your number for the 24th April, to my brief remarks at the meeting.

Mr. Palmer, the inventor of glyphography, certainly practised the nature-printing process, and that long before its publication in Austria. He took lace, for example, hardened it by dipping in a solution, placed it between a thin plate of lead and a plate of steel, and, thus arranged, passed it through a strong copper-plate press. The result was a "nature-printed" impression on the lead, from which he made an electrotype reverse; in fact a *surface* block, printing at letter-press black lace on a white ground. From this reverse he produced a second electrotype plate, an intaglio, similar to the original lead impression, and this could be worked either at copper-plate or letter-press; from the former giving the effect of black lace on a white ground, and from the latter the effect of white lace on a dark ground—beautiful either way. Mr. Palmer applied the same process to the dried leaves of plants.

I am prepared to establish the correctness of my memory on these matters, by the evidence of assistants who worked the invention for Mr. Palmer, about 1840. My belief has never been that the gentlemen of the Austrian press were inventors of "nature-printing." I have rather supposed that, becoming acquainted with the inventions of men like Peter Kyhl and Palmer, they, very properly, used the government funds at their command to give publicity in their own country to the results of those processes. Without doubt they were acquainted with Palmer's other inventions, for in 1851 they exhibited specimens of glyphography, and, I think, of electrotint also.

It may not be amiss to recall attention to Palmer's "Electrotint," for which he took a patent in June, 1841. His object was to produce, from an artist's specially prepared painting, without the intervention of an engraver, an electrotype plate, which could be worked at the copper-plate press, and blocks, suitable to the letter-press. I cannot say much for the blocks, but with the plates he certainly succeeded to some extent, as witnessed by several very respectable half-guinea prints published at the time; among others, two fruit pieces by George Lance, favourably noticed in the *Times* of Jan. 15, 1842.

Palmer's plan differed from the ingenious invention of Mr. Wallis, in this particular, if in no other. He gently deposited electrotype copper upon the uneven surface of the painting till the copper became sufficiently thick to work from in the usual way; while Mr. Wallis forces the painting into the smooth face of a yielding metal. The former the work of days, the latter of a moment only.

Mr. Palmer's charge for a finished plate was 9d. per square-inch, and 1s. 6d. per square-inch for a surface block; but, notwithstanding its cheapness, the invention has passed out of use.

Sincerely wishing a better reward for the ingenuity and perseverance of Mr. Wallis,

I am, &c.,

WILLIAM DICKES.

5, Old Fish-street, Doctors' commons.

QUEEN'S COLLEGE.

Sir,—My attention has been called to the report of the proceedings of the Committee on Education in a recent number. In that report, Dr. Yeats, Mr. Watkins, and Mr. Whittington are represented as having drawn attention to the system of education and examination at Queen's College, London, and I cannot but feel grateful for the kind manner in which they have spoken of the work which the college has done in raising the standard of female education generally.

There is, however, an error of detail in the report which you will, perhaps, permit me to correct. Mr. Whittington stated, in his remarks, that any lady could be examined at Queen's College on payment of a fee of five shillings. The actual scale of payment is one guinea for the first examination, and half a guinea for each subsequent one.

I send by book-post a printed syllabus showing the extent and character of our examinations, and a prospectus of our college course, and shall be happy to forward copies of both or either to any of your readers who may wish to know more about us.

I am, &c., E. H. PLUMPTRE.

Queen's College, 67 and 68, Harley-street, W.
April 29th, 1863.

COMMITTEE ON MANUFACTURES.

Sir,—I beg to draw your attention to an inaccuracy in the report of this day's *Journal*, of the suggestion I made at the invitation of the Chairman of the Committee on Manufactures, held on the 1st instant, in reference to the working in the precious metals.

The suggestion I made was, that it would greatly benefit the trade, and the public in general, if an Institution or arrangement could be made to collect together the many important facts resulting from experience, and communicating them to the rising workers in the trade, or others who wanted such information, so as to save the great loss of very valuable material and much time, resulting from a knowledge of first principles and experience.

It never occurred to me to invent a machine to extort valuable trade secrets of any sort, but as free trade is now an acknowledged advantageous principle in commerce, I cannot see why it should not be of equal value in thought; and in my own case I have always found it to be so, for, by freely communicating, from time to time, the knowledge gained by my own experience, to those persons who desired such information, I have always found others ready to communicate to me the result of their experience, thereby making a mutual advantageous exchange.

It was very late in the meeting that I was called upon for my suggestions, and being the only speaker upon the subject, I cannot understand who were the several members of the Committee who are reported gratuitously to have "expressed their opinion that there would be little chance of inducing manufacturers to divulge valuable trade secrets for the benefit of the community at large," which is to my mind a very vague expression. The report does not give the name of any of the several members so expressing their opinions, but presuming that their observations did not reach my ears, I would refer them to a work upon assaying gold and silver, by Mr. James H. Watherston, a member of the Society of Arts, in which he gave much valuable information to the community, and the whole of the profits accruing from the sale of that work to the funds of the Goldsmiths' Benevolent Institution, whereby he conferred a double benefit, without any view to his own individual interests.

With the object as above stated, apart from the counter-expressed opinions, as reported, I shall at all times be happy to join in any effort to advance the free intercommunication of knowledge acquired and experience gained, and from my knowledge of the workers in the precious metals I am convinced that we may expect much valuable assistance from the trade in general.

I am, &c.,

E. NASH.

30, Coppice-row, May 8, 1863.

Proceedings of Institutions.

Sheffield Literary and Philosophical Society.—The annual conversazione was held in the Cutler's hall, on Thursday evening, the 29th January, and went off very successfully. The committee entrusted with the arrangements consisted of Messrs. Sorby, Hambly, and Stuart, and through their exertions many objects of great interest were exhibited. Amongst them may be mentioned portions of the shot, holes, and armour-plate used

in the experiments at Shoeburyness; models of ships of war; a collection of photographic portraits of eminent men, contributed by several London photographers; Parian busts from the Art Union, lunar photographs lent by Messrs. Smith and Beck. In the fine art department Mr. Edwin Smith exhibited his machine for copying sculpture. The plan of its operation is as follows:—The bust or statue to be copied is placed on a revolving pedestal, and on a corresponding pedestal is placed a block of stone, roughly cut into a shape somewhat resembling the work to be copied. Over the copy and the block is suspended a lever, on one side of which is a blunt pointer, which touches the copy, and on the other a graving tool, which touches the block to be cut. As the machine works, the block is cut down until the pointer touches the copy, and as it follows the variations of the one the graving tool makes corresponding shapes on the other, until a faithful and perfect tracing is obtained. The machine was worked by a small model steam-engine, lent by Messrs. Chadburn Brothers. Specimens of Mr. Ransome's artificial stone, electric deposits, contributed by Messrs. Ratcliff and Co., through Mr. Edmund Heeley, were exhibited. Another application of electro-plating was exhibited by Mr. R. Drury—the electro-plating of lead with pure grain tin, his object being to do away with the sanitary objections to lead for water-pipes and cisterns. Messrs. Parkin and Bacon exhibited in operation a lithographic press, on which they were working fac-similes of the autographs of the presidents of the Literary and Philosophical Society from 1823 to 1863, which they presented to the visitors. Telegraphic science was represented by Messrs. Siemens, Halske, and Co.'s alphabetical telegraph, and by the printing telegraph of the same firm. Mr. Siemens also exhibited a model of his regenerative furnace, which has been used in the melting of glass. Messrs. J. B. Newhall and Co., of Sloane-street, London, exhibited an application of electricity to domestic purposes, in an arrangement of house bells which ring by the completion and breaking of an electric current. In the chemical department were shown specimens of a new invention, patented by Mr. A. Parkes, of Birmingham, and called after him, "Parkesine." It is a compound of oil, chloride of sulphur, and collodion, and is intended as a substitute for india-rubber and gutta-percha. Another substitute for india-rubber, invented by Mr. Frederick Walton (described in the *Journal*, vol. x., p. 324), to which he has given the name of "Campticon," was exhibited. The Sheffield School of Practical Science contributed a series of specimens of palm oil bearing upon manufactures, and also a series illustrating the manufacture of aluminium and aluminium bronze. An address was delivered by Dr. Elam, the President of the Society, in which he directed attention to some of the most remarkable objects exhibited.

TROWBRIDGE MECHANICS' INSTITUTION.—The adjourned annual meeting was held on Tuesday, January the 6th; T. CLARK, Esq., the President of the Institution, in the chair. Mr. Gauntlett read the report. The most important feature of the Institution is the lectures, of which 21 have been delivered during the year. The list shows a larger proportion of professional lecturers than in any previous year, many of them gentlemen of the highest reputation in their respective spheres. The members have never before received so large a return for their subscriptions. The committee expected to have effected a saving by making these engagements with lecturers, jointly with several neighbouring institutions, but in this their hopes have not been realised. The necessity of each institution sinking its own individual choice of lecturers, except to a very limited extent, is a great drawback and set-off to the advantage that occasionally occurs of paying a lower fee. The experiment was, however, worth a trial. The engagement of a larger proportion of professional men than usual has considerably increased the amount paid for lectures, and as there has been a decrease in the number of members, the subscriptions have not been sufficient to meet this increased expenditure. The classes have been well attended, and the several teachers report that their progress has been satisfactory. The thanks of the members are due to these gentlemen, who have given their gratuitous service in teaching. The short-hand class, owing to the small attendance, has been discontinued, and a drawing class commenced, for which the committee engaged a competent teacher, Mr. Millington, and they trust that a large number of members will avail themselves of the opportunity thus afforded them. The elocution and elementary singing classes are still continued. In the latter class the Tonic Sol-fa notation and system is used. The library continues to be much used. During the year about 1,290 bound volumes, 3,326 periodicals, and 361 newspapers, have been taken home by the members. The reading-room has been attended by a large number of readers, while the conversation and class-rooms have relieved it of the attendance of some who could scarcely be classed with the readers. The number of members is 306, the majority being of the mechanic or working classes. The reduction in the number as compared with the corresponding period of last year, caused by the depression of trade, and reduced earnings of the working classes, has contributed to render the financial position unsatisfactory, and leaves the institution in debt. The front room would continue to be used as a smoking and bagatelle room until March, when it would become part of the Institution suite; and this added convenience cannot fail largely to enhance the advantages of the Institution. Amongst the lecturers who are engaged for the remainder of the session, are Mr. George Dawson, of Birmingham; Dr. Letheby; Mr. Fairbairn, of London (for musical entertainment); Mr. Henry Nichols; Mrs. Balfour; and Mr. E. Wheeler (for his popular lecture on electricity). The Rev. William Barnes, author of the celebrated poems in the Dorset dialect, has promised a reading. Captain Gibney has also promised a lecture. Several gentlemen have promised their assistance in giving penny readings. The treasurer's cash account was then read by Mr. A. Gregory. The receipts were, from subscriptions, &c., £94 10s. 0½d.; from proceeds of lectures, £33 5s. 8d.; the late Mr. Brown's annuity, £5; from sale of old papers, £1 11s.; and a balance from the last account, £2 4s. 8d.—making a total of £136 11s. 4½d. The principal items in the expenditure were, for rent, £23 13s.; for lecturers' fees and expenses, £52 15s.; papers and periodicals, £12 13s. 11d.; printing, £5 16s. 6d.; gas, £3 12s. 6d.; attendance (librarian), £15 12s.; poles for gymnasium, £2 11s. 6d.; the cash balance in the treasurer's hands being £7 12s. 4½d; against which there were outstanding accounts amounting to £24 19s. 6½d., showing a deficiency of £17 7s. 2d.; or, if to this be added the amount £13 6s. 6d., subscribed for and to be spent in books, it will increase the deficiency to £30 13s. 8d. The election of officers then took place, and a vote of thanks to the chairman terminated the meeting.

MEETINGS FOR THE ENSUING WEEK.

MON. ...British Architects, 8.
Asiatic, 3. Annual Meeting.
Royal United Service Inst., 8½. Commander T. E. Symonds, "Steering and Manœuvring Ships with Broadside Batteries, by Means of Twin Screw Propellers."

TUES. ...Civil Engineers, 8. 1. Discussion upon Mr. Watson's paper, "On the Communication between London and Dublin." 2. Mr. J. Fernie, "On the Manufacture of Duplicate Machines and Engines."
Statistical, 8.
Pathological, 8.
Ethnological, 4. Annual Meeting."
Royal Inst., 3. Prof. Tyndall, "On Sound."
Architectural Museum, South Kensington, 7½. Mr. Wm. White, "On the Wrought Iron Work of the Great Exhibition of 1862."

WED. ...Society of Arts, 8. 1. Mr. B. H. Paul, "On Destructive Distillation, considered in reference to Modern Industrial Arts."
Geological, 8.
Pharmaceutical, 11 A.M. Annual Meeting.
THURS...Royal, 8½.
Antiquaries, 8½.
Chemical, 8. Mr. W. R. Grove, Q.C., "On certain Effects of Intense Heat on Fluids."
Numismatic, 7.
Philosophical Club, 6.
Royal Inst., 3. Prof. Ansted, "On Geology."
FRI. ......Royal Inst., 8. Prof. Roscoe, "On the Sun's Chemical Action."
R. United Service Inst., 3. Capt. Sir Sibbald Scott, Bart., "The History of the Bayonet."
SAT.......Royal Botanic, 3¾.
Royal Inst., 3. Professor Max Muller, "On the Science of Action."

To Correspondents.

ERRATUM.—In last number, page 432, col. 2, line 4 *et seq.* from bottom, for "Mr. Robinson had fully recognised the desire of the native community to avail themselves of the benefits of education," read, "Mr. Robinson had fully recognised the desire of the Europeans to afford to the native community the benefits of education."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 24th March, 1863.

Par. Numb.
115. West India Colonies (Salaries of Colonial Offices)—Returns.
98. Poor Removal—Return.
72. Bill—Office of Secretary at War Abolition.
29. Railway and Canal, &c. Bills; (156. Albert Bridge; 157. Blackfriars Bridge; 158. Dengie (Essex) Reclamation; 159. Dundalk, Carlingford, and Greenore Railway; 160. Frieston Reclamation; 161. Fulham Bridge; 162. Horsey Island Reclamation; 631. Irish North Western Railway)—Board of Trade Report.
North America—Despatch from her Majesty's Minister at Washington (No. 4).

Delivered on 25th March, 1863.

60 (1.) Atlantic Royal Mail Steam Navigation Company—Further Return.
117. Tonnage—Return.
119. Jessie Maclauchlan—Return.
120. Civil Services (Votes on Account)—Estimate.
67. Bill—Public Houses.
Captain Grant's Cooking Apparatus—Reports.
29. Railway and Canal, &c. Bills (164. Mersey Docks and Harbour Board; 165. Metropolitan Bridges; 166. North Eastern and Stockton and Darlington Railway Companies Amalgamation; 167. Putney and Fulham New Bridge; 168. Rumney and Brecon and Merthyr Tydfil Junction Railway; 169. South Mayo Railway; 170. Tramore Embankment; 171. Tranmere Docks)—Board of Trade Reports.

SESSION 1861.

324 (E.) Poor Rates and Pauperism—Return (E.) (Insane Paupers).

Delivered on 26th March, 1863.

50 (3.) Railway and Canal, &c. Bills—Fourth Report from the General Committee.
55 (7.) Civil Services—Estimates (Class 7.)
116. Army (Expense of Gunner, &c.)—Return.
100. Poor Relief (Lancashire, &c.)—Return.
62. Bill—Writs Prohibition.
Metropolitan Railways—Report by Colonel Yolland.

Delivered on 27th March, 1863.

127. Sir W. Armstrong—Return.
129. Customs Acts (1860)—Return.
95. East India (Plantations)—Return.
109. Fisheries (Ireland)—Return.
Education (Grants to Normal Schools, &c.); Minute of Privy Council.

Delivered on 28th, 30th, and 31st March, and 1st, 2nd, 4th, 7th, 9th, 11th, and 13th April, 1863.

94. Weights and Measures (Metropolis)—Return.
114. Convict Prison (Portsmouth)—Return.
123. Navy (John Clare, &c.)—Return.
126. Army (Military Surgeons)—Return.
130. Galway Subsidy—Return.
131. Treasure Trove—Return.
134. Salmon—Return.
45 (2). Trade and Navigation Accounts (28th February, 1863).
80. East India (Army)—Return.
143. Convicts—Return.
124. Navy (John Clare)—Return.
121. East Asdee Lands (Ireland)—Return.
125. The "Alabama"—Return.
101. Churchyards—Return.
87. Courts of Probate (London and Dublin)—Account.
108. East India (Isthmus of Kraw Railway)—Return.
122. Army (Artillery and Engineers)—Returns.
103. Gethin Colliery Accident—Return.
55 (1). Civil Services—Estimates (Class 1).
55 (3). do. do. (Class 3).
55 (4). do. do. (Class 4).
81. East India (Sedashegar Harbour)—Return.
135. Court of Chancery (Suitors' Funds)—Return.
144. Edinburgh Royal Botanical Gardens—Return.
55. Civil Services—General Abstract of the Grants.
140. Labourers' Cottages (Ireland)—Return.
142. Army (Artillery)—Return.
149. Police Arrangements (London)—Copy of a Report from the Lord Mayor
132. East India (Cotton)—Return.
139. Army (Rifles)—Return.
29. Railway and Canal, &c., Bills.—172. Athenry and Ennis Junction Railway (Abandonment); Athenry and Ennis Junction Railway (Extension of Time); 173. Barnes, Hammersmith, and Kensington Railway; 174. Buckley Railway—Supplemental Report; 175. Dare Valley Railway; 176. Great Eastern Railway (March and Spalding Line); 177. Great Northern Railway (Spalding to March); 178. Hastings Pier, Harbour, and Railway; 179. Ilfracombe Railway; 180. Lancashire and Yorkshire Railway (Doncaster, Goole, and Hull Lines); 181. Metropolitan Railway; 182. Mid Kent Railway; 183. Newry and Greenore Railway, Pier, and Wet Dock; 184. Newtown and Machynlleth Railway (Agreement with Great Western Railway Company); 185. North and South Staffordshire Junction Railway: 186. Oswestry and Newtown Railway (Branches, &c.); 187. Portadown, Dungannon, and Omagh Junction Railway; 188. Potteries Junction Railway; 189. Waterford and Passage Railway and Ferry; 190. West Riding and Grimsby Railway and West Shropshire Mineral Railway; 191. Wolverhampton and Bridgnorth Railway)—Board of Trade Reports.
36. Bills—Jurors' Remuneration.
76. ,, Stocks Certificates to Bearer.
75. ,, Telegraphs (as amended in Committee, on re-commitment, and on second re-commitment).
Fire Insurance Duties—Revised Report.
United States (Suppression of the African Slave Trade)—Additional Article to Treaty.
Bombardment of Belgrade—Correspondence.
Church Estates Commissioners—Twelfth General Report.
Ecclesiastical Commissioners—Fifteenth General Report.
Public General Acts—Cap. 1, 2, 3, 4, 5, 6, and 7.

SESSION, 1862.

307 (B.) Poor Rates and Pauperism—Return (B.)

Delivered on 14th April, 1863.

105. Army (Clothing Factory)—Return.
29. Railway and Canal, &c. Bills (192. Beckenham, Lewes, and Brighton Railway; 193. Boston and Frieston Shore Railway and Pier; 194. Bradford, Wakefield, and Leeds Railway; 195. Great Eastern Railway (Additional Powers); 196. London and North Western Railway (Additional Powers); 197. Ludgate Station and Junction Railways; 198. Midland Railway (New Lines); 199. Oswestry and Newtown and other Railway Companies; 200. Oswestry, Ellesmere, and Whitchurch Railway; 201. Welch and Midland Counties Junction Railways; 202. West Midland Railway; 203. Worcester, Dean Forest, and Monmouth Railway; Wrexham, Mold, and Connah's Quay Railway)—Board of Trade Reports.
Births, Deaths, and Marriages in England—Annual Report of the Registrar-General.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 8th*, 1863.]

Dated 14th January, 1863.

166. W. Pidding, Cole-street, Southwark—Imp. in the soles and heels of boots and shoes, in stud nails, tips, and toe or other plates used therewith, and in placing and securing them.

Dated 11th February, 1863.

373. C. P. Carter, Kennington-hall, Kent—Imp. in pavements for roads, streets, or ways.

Dated 26th February, 1863.

540. A. Capello, 4, Rue du Repentir, Marseilles—An improved method of, and apparatus for, glazing Morocco leather.

Dated 9th March, 1863.

655. W. J. Clapp, Nantyglo Iron Works, and N. Coats, Serhowy Iron Works, Monmouthshire—Improved armour plates for vessels, turrets, targets, forts, and other structures in which armour plates are or may be used.

Dated 27th March, 1863.

805. W. Clark, 53, Chancery-lane—Imp. in winding or copping frames. (A com.)

Dated 30th March, 1863.

817. T. Barnes, Earl of Dundonald, 12, Queen's-gate, Hyde-park—Imp. in treating fats and fatty oils and volatile oils or essential oils.

Dated 1st April, 1863.

839. W. Clark, 53, Chancery-lane—Imp. in preventing fermentation in alcoholic and other liquids while drawing them from their containing vessels, and in apparatus for the same. (A com.)

Dated 7th April, 1863.

875. J. Macintyre, Burslem, Staffordshire—Imp. in the manufacture of knobs and other articles in china and earthenware.

Dated 9th April, 1863.

895. F. J. Risse, Carlisle—An improved haft or handle for holding tools or instruments of various sizes.
901. G. Ferrand, Wooley-bridge, Derbyshire—Certain imp. in apparatus for supplying oil or other liquid lubricant to frictional surfaces.

Dated 11th April, 1863.

930. R. Newton, Leeds—Imp. in machinery for separating and straightening the fibres of silk waste and other fibrous substances.

Dated 15th April, 1863.

945. T. Gray, Lower Mitcham, Surrey—Imp. in preparing and bleaching flax, hemp, and other vegetable fibres, by which a brilliant lustre is imparted to those substances, and the fibres are separated.

Dated 20th April, 1863.

984. E. W. Hughes, 28, Great George street, Westminster—Imp. in turn tables, turn bridges, and slips.

Dated 21st April, 1863.

986. H. Raften, 5, Barr's-hill-terrace, Coventry—An improved process of obtaining printing surfaces.

Dated 22nd April, 1863.

1006. G. B. Barber, Manchester—Imp. in steam boilers, and apparatus connected therewith.

Dated 24th April, 1863.

1014. J. Cavanah, 21, Parron-street, Paddington, Liverpool—An imp. in cricket bats.
1018. J. Sheppard, Canterbury—Imp. in steam engines.
1022. J. Cornes, Roden-villa, and J. C. Davis, Cranbrook-park, Ilford—Imp. in lawn mowing, rolling, and collecting machines.
1024. J. Thompson, Bilston, Staffordshire—Imp. in machinery for punching metals.
1026. J. Hinks and J. Newman, Birmingham—Imp. in the manufacture of buttons.

Dated 25th April, 1863.

1028. C. Pooley, Manchester—Imp. in certain parts of machinery for preparing and spinning cotton and other fibrous substances.
1030. S. Harrison, York-street, Sheffield—A new and improved mode of manufacturing type for letter-press printing.
1032. T. A. Weston and C. Vivian, Birmingham—Imp. in pulleys, capstans, and other machines for raising weights and transmitting motive power.
1036. A. Poirrier and C. Chappat, jun., Paris—Imp. in the manufacture of blue and violet colouring matters suitable for dyeing and printing.
1038. C. Beyer, Manchester—Imp. in safety valves. (A com.)
1042. W. E. Newton, 66, Chancery-lane—Imp. in thrashing machines, part of which imps. are also applicable for hulling, decorticating, cleaning, and polishing grains and seeds. (A com.)

Dated 27th April, 1863.

1048. J. J. Robert, 112, Rue du Temple, Paris—Imp. in the manufacture of spoons and forks.
1050. M. Valkenhuyzen, Paris—A new castor for furniture.
1052. J. Jeffreys, Upper Norwood, Surrey—Imp. in constructing surface condensers, and apparatus for heating and cooling fluids.
1054. R. A. Brooman, 166, Fleet-street—Imp. in twisting and doubling silk, and in frames employed therein. (A com.)
1056. W. Hudson and C. Catlow, Burnley, Lancashire—Imp. in looms for weaving.
1058. H. Beare, Newton Abbot, Devonshire—Imp. in machines for thrashing out corn from its straw, part of which is applicable for combing the straw.

Dated 28th April, 1863.

1060. J. Marris and W. Marris, Great Grimsby—An improved machine for breaking loaf sugar.
1068. G. S. Macdonald, Meard's-street, Soho—Imp. in card cases.
1070. R. Butterworth, Failsworth, Lancashire—Certain imp. in carding engines to be employed for carding cotton and other fibrous substances.
1072. G. E. Donisthorpe, Leeds—Imp. in apparatus used when getting coal and other minerals.
1074. S. S. Marling, Stanley-park, Gloucestershire—Improved machinery for scouring, washing, and cleansing woollen cloths and other fabrics.

Dated 29th April, 1863.

1078. W. E. Gedge, 11, Wellington-street, Strand—An improved system of permanent advertisement. (A com.)
1080. Capt. W. Rodger, R.N., 9, Shawfield-street, King's-road, Chelsea—Imp. in anchors.
1084. G. Holcroft, Manchester—Imp. in the construction of pyrometers.
1086. M. Henry, 84, Fleet-street—Imp. in apparatus for manufacturing beton and artificial stone, pugging clay, and other similar purposes, and in the production of artificial stone, and artistic, ornamental, and decorative articles, works, and surfaces. (A com.)

Dated 30th April, 1863.

1088. A. H. Remond, 4, Moorgate-street—An improved process for retaining the aroma of coffee and cocoa.
1092. C. P. Stewart, Manchester, and J. Kershaw, Duke-street, Westminster—Imp. in engines, machinery, and apparatus for obtaining compressed air, and for applying the power thereof in propelling railway and other carriages.
1094. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in rotatory engines. (A com.)

Invention with Complete Specification Filed.

1076. E. Rowland, Manchester—Certain imp. in apparatus for weighing solid bodies and measuring fluids, parts of which imp. are also applicable to the opening and closing of dampers.—29th April, 1863.

Patents Sealed.

[*From Gazette, May 8th*, 1863.]

May 8th.

3017. G. H. Ogston.
3019. W. Simpson.
3027. J. B. Lavoine.
3037. W. Booth, J. Booth, and T. Booth.
3038. W. Palliser.
3039. H. Burridge.
3040. J. J. Parkes.
3041. E. Marriott and S. Holroyd.
3045. W. Dobson.
3048. F. J. Clowes.
3053. A. Twaddell.
3057. J. Slack.
3058. M. Defries.
3063. R. A. Brooman.
3082. J. Wilson.
313. G. Haseltine.

[*From Gazette, May 12th*, 1863.]

May 12th.

3068. W. H. Andrew.
3077. A. Illingworth and H. Illingworth.
3081. W. H. James.
3083. G. Gray.
3084. F. Palmer.
3089. W. Williamson.
3110. C. Kilner, G. Kilner, W. Kilner, and J. Kilner.
3117. G. W. Oldham.
3124. W. Bottomley.
3136. J. Taylor, jun.
3145. W. Clark.
3147. J. Webster.
3150. W. Clark.
3168. T. Fletcher.
3216. J. Irwin.
3249. H. Swan.
3254. G. Lewal.
3294. J. H. Johnson.
3400. A. V. Newton.
63. G. T. Bousfield.
154. G. Haycraft.
282. W. E. Newton.
307. W. G. Valentin and F. Levick.
446. G. T. Bousfield.
479. W. Wood.
512. R. W. Thomson.
529. W. E. Newton.
532. J. Inglis.
569. D. Collinge.
572. J. Penn.
658. J. H. Johnson.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, May 12th*, 1863.]

May 4th.

1128. J. D. Dougall.

May 8th.

1158. G. Price.
1182. E. Lord.

May 9th.

1170. J. Owen and G. Veitch.
1223. S. Holdsworth, J. Henderson, W. Henderson, and T. Bagley.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, May 12th*, 1863.]

May 4th.

1057. W. Bulmer and I. Sharp.

May 7th.

1088. A. V. Newton.
1102. R. A. Brooman.
1113. B. Beniowski.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4555	May 6.	Ramrod	James Gunner	War Department, Enfield.
4556	,, 7.	Portable Mangle	Harper Twelvetrees	Bromley, by Bow.
4557	,, 8.	Locket Case and Pendant	George Hazelton	Richard-street, Hockley, Birmingham.

Journal of the Society of Arts.

FRIDAY, MAY 22, 1863.

TWELFTH ANNUAL CONFERENCE.—NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The Twelfth Annual Conference of the representatives of the Institutions in Union, and of the Local Educational Boards, with the Council, will be held on Friday, the 12th June, at Twelve o'clock noon. Sir Thomas Phillips, Chairman of the Council, will preside.

Secretaries of Institutions in Union are requested to forward, *as soon as possible*, to the Secretary of the Society of Arts, the names of the representatives appointed to attend the Conference.

The chairmen of, or representatives from, the Local Educational Boards are invited to attend. The representatives present at the Conference will be invited to the Society's Conversazione, which will take place on the evening of the same day, at the South Kensington Museum, and will receive their cards on application at the Society's House on the day of the Conference.

CONVERSAZIONE.

The Council have arranged for a Conversazione at the South Kensington Museum, on Friday evening, the 12th June, for which cards will shortly be issued.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following additional names have been received up to the 21st inst. :—

Appold, John George, F.R.S.	£1	1	0
Buccleuch, The Duke of, K.G.	1	1	0
Hambro, Baron	1	1	0
Hubert, Samuel Morton	1	1	0

DWELLINGS FOR THE WORKING CLASSES.

With a view to promote enlarged investments of capital in model dwellings and other establishments for the benefit of the working classes, the Council of the Society of Arts has instituted a statistical inquiry into the results hitherto obtained, including family dwellings of every description, model lodging-houses, dormitories, refuges, baths and washhouses, soup kitchens, coffee-houses, &c.

Members and others who can supply information or indicate sources where it may be obtained, are requested to communicate with the Secretary, who will send blank forms for being filled up with the required data.

PRIZES TO ART-WORKMEN FOR ART-WORKMANSHIP.

The following notice has been issued by order of the Council* :—

I. The Council of the Society of Arts hereby offer prizes to Art-workmen for the successful rendering of the undermentioned designs in the undermentioned processes of manufacture, according to the directions detailed in each case.

II. Such designs will be by artists of great reputation, to be translated into the various modes of workmanship, and photographs and castings of such designs will be sold by the Society, at the Society's House, at cost price, to persons desiring to be competitors. The prices of the photographs and castings are stated after each subject.

III. The works to be executed will be considered to be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

IV. The exhibitors are required to state in each case the prices at which their works may be sold, or if sold previously to exhibition, at what price they would be willing to produce a copy.

V. The awards in each class will be of two grades, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the award ; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

VI. The prizes will be presented publicly. Before the award is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

1. Modelling in Terra Cotta, Plaster, or Wax.

(*a.*) *The Human Figure in bas-relief.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's design of the "Three Graces."* Dimensions—The figures are to be 9 inches high.

[Photograph—One shilling.]

(*b.*) *Ornament in bas-relief.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas van Leyden, 1528. Dimensions, 12 inches by 6 inches.

[Photograph—Sixpence.]

2. Repoussé Work in any Metal.

(*a.*) *The Human Figure as a bas-relief.*—A prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's "Three Graces."* Dimensions—The figures are to be four inches.

[Photograph—One shilling.]

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a Flemish salver in the South Kensington Museum, date about 1670, No. 1153. Dimensions—Ten inches in diameter.

[Photograph—One shilling.]

3. Hammered Work, in Iron, Brass, or Copper.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after an iron German arabesque, about 1520, in the South Kensington Museum, No. 2450. Dimensions—12 inches by $1\frac{1}{2}$ inch.

[Photograph—One shilling and threepence.]

4. Carving in Ivory.

The Human Figure in bas relief.—One prize of £10 for the best and a second prize of £5 for the next best, work

* Copies may be had on application to the *Secretary*.

executed after a Terra Cotta ascribed to Luca della Robbia, about 1420, in the South Kensington Museum, No. 7610. Dimensions—The plaque to be four inches high.

[Photograph—One shilling.]

5. Chasing in Metal.

(*a.*) *The Human Figure.*—One prize of £10 for the bes and a second prize of £5 for the next best, work executed after a reduced copy of *Gibson's "Psyche."*

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society, price, 12s. A plaster cast may be obtained from D. Brucciani, 39, Russell-street, Covent-garden, W.C., price, 3s. 6d.

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a bronze plaque in the South Kensington Museum, No. 1217.

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society, price 1s.

6. Enamel Painting on Metal, Copper, or Gold.

(*a.*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's design of the "Three Graces,"* executed in *grisaille.* Dimensions—The figures are to be four inches high.

[Photograph—One shilling.]

(*b.*) *Ornament in grisaille.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a German arabesque (16th century). Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

7. Painting on Porcelain.

(*a*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's "Boy bearing Doves,"* in the cartoon of the "*Beautiful Gate.*" Dimensions, the same as the Photograph. This work is to be coloured according to the taste of the painter.

[Photograph—Ninepence.]

(*b.*) *Ornament.*—One prize of £5 for the best and a econd prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, 1528, and coloured according to the taste of the painter. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

8. Inlays in Wood (Marquetry, or Buhl), Ivory or Metal.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a majolica plate in the South Kensington Museum, 1490, No. 1671. Dimensions—The same as the Photograph.

[Photograph,—One shilling and threepence.]

9. Engraving on Glass.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, 1528, engraved the height of the photograph; and if round a glass or goblet, repeated so as to be not less than 9 inches long when stretched out.

[Photograph—Sixpence.]

10. Embroidery.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a German example in the Green Vaults at Dresden. Dimensions, according to the taste of the embroiderer.

[Photograph—Sixpence.]

VII. The Council cannot hold itself responsible for any accidents or damages of any kind, occurring at any time.

VIII. Persons intending to compete should give notice, in their own names or by cypher, to the Secretary of the Society of Arts, John-street, Adelphi, W.C., on or before the 15th July, 1863.

IX. Each work must be marked with the name of the Art-workman, or, if preferred, with a cypher, accompanied by a sealed envelope, giving the name and address of the Art-workman, and delivered free of all charges, at the Society of Arts' House, John street, Adelphi, London, W.C., on or before the 31st August, 1863.

COMMITTEES OF REFERENCE.

COMMERCE.

A Meeting of the Committee on Commerce took place on Friday afternoon, 15th of May, Sir Thomas Phillips, Chairman of the Council, in the chair.

The Chairman opened the business by explaining that the subdivision upon which they were now assembled was that of Commerce, doubtless a very wide subject, but it was probable that some especial topics under that head might be suggested, which might hereafter be usefully considered.

The Secretary read the following letter:—

Dear Sir,—I am desirous of suggesting whether this Committee could not advantageously put itself into communication with the Associated Chambers of Commerce. As you are no doubt aware, the Chambers of Commerce in different parts have a common action, with the exception of Manchester and Liverpool, each of which prefers acting alone and independently. The other Chambers have joint action, and meet once a year in London. Now in London there is no Chamber. Each special interest is separately allied, and thus subjects of *general* interest are not taken up by any special body.

Without defining any plan, which of course would require mature consideration, or without more than hinting that the connection might be only at a *touching* point, rather than as a combination or a central head, I venture to urge that the Committee of the Society of Arts might do much in circulating information through Chambers of Commerce, as it has done in other branches of its wide domain—Art and Education, *par exemple.*

The statistical portion of the Committee—presuming there is such a section—could find ample sources of information in the Board of Trade Returns, which, were they more widely used and their contents diffused, would be invaluable to the country, to which they are perfectly accessible, though, for want of machinery for circulation, at present sealed.

Then, again, through the Chambers the Committee could at once extract and condense information on all subjects of importance.

This last would be especially useful in treaties of commerce. The Government wants a machine for extracting information, getting it into shape, and then supplying to them the bases of commercial treaties. British interests are so multifarious that in recent treaties this want of information and of an organised means of obtaining it has been most evident. Probably more will be done for British commerce by means of treaties yet to be made (apart from British energy) than by any other practical mode of action. I am, &c.,

JOHN WHITWELL.

Kendal, May 14th, 1863.

P. Le Neve Foster, Esq.

The Chairman said he should be happy to hear sug-

gestions as to whether the objects of the Society could be promoted by any organisation in connection with the Chambers of Commerce.

Mr. Ogilvie thought an organisation in London would be desirable. Although an annual conference of the Chambers was held, there did not appear to be any regular organisation of those bodies for any practical purposes. He doubted whether the question of copyright came under the province of this Committee, and remarked that he believed at the present moment the question of copyright was under consideration in France with a view to some alteration in the law there.

The Chairman remarked that he believed in France there was a desire to give more consistency to the laws of copyright than there was at present. It was discussed at some length at a recent meeting of artists whether copyright of all kinds, literary and artistic, should not be placed on the same footing. It had also been discussed whether any attempt should be made during the present session of Parliament to remedy certain supposed defects in the present law of Art Copyright, but a recent case, decided in the Court of Common Pleas, had shown that the existing law was sufficient for the protection of engravings from photographic piracies. Another question had arisen as to whether they could usefully promote the assimilation of the law of copyright throughout the various European countries.

Mr. F. Lawrence thought the subject of copyright hardly came within the scope of this Committee, except as regarded the question of trade marks, which required to be treated differently to copyright of designs, &c. The law with regard to trade marks was undoubtedly very imperfect and unsatisfactory.

A Member of the Committee inquired whether the Society had taken any action on the subject of uniformity of weights and measures throughout the kingdom?

A conversation then ensued on this subject, when Mr. Dillon stated that a bill was now being introduced into Parliament by Mr. Ewart for legalizing the metrical system in this country.

The conversation then turned upon the subject of decimal coinage and the various schemes which had been propounded for the establishment of a decimal system of currency and accounts in this country. Whilst the advantages of such a system were for the most part admitted, the difficulties in the way of its adoption were adverted to.

Mr. Lawrence thought that with the great extent of our commercial operations a change of system would be attended with difficulty, although no doubt the community would gradually adapt themselves to the altered state of things. With regard to the greater facilities of accounts under the decimal system, he thought it must be a large establishment where the services of one clerk could be saved under that system.

After some remarks by Mr. Symonds, Mr. Fisher, and others,

The Chairman inquired whether any member of the committee had any suggestions to offer on the subject of international postage, as one bearing largely upon commerce.

Mr. Ridley asked what was the object of the Congress at present sitting in Paris on the subject of postal communication, to which it was replied, that it was understood to be to establish a system of parcels post.

Mr. Ogilvie said he believed the object was to assimilate the postage rates on the Continent with our own, but the French gramme stood in the way of that assimilation.

The Chairman inquired whether any improvements could be suggested with reference to the postal communication with our colonies.

Mr. Lawrence replied, that since the recent reduction it had been very satisfactory. Mr. Lawrence mentioned anomalies that existed between the French and English systems of postage, in which in cases of unpaid letters grievance was often inflicted.

Mr. Kerr called attention to the high rate of postage between this country and America, the charge at present being 1s. per letter. He thought so high a charge was much against the postal interests of both countries.

Mr. Symonds mentioned that delegates had assembled in Paris on this subject, and he suggested that it might be desirable to ascertain the result of their deliberations.

Mr. H. Webber reopened the subject of the anomalies in weights and measures in this country, and remarked that before they could expect uniformity in other countries, it behoved them to set their own affairs in order. Weights and measures varied very much in different parts of the country. He suggested that a practical means of procuring uniformity of weights and measures might be obtained through the operation of a central body in London, who should communicate on the subject with the great centres of trade throughout the country.

The Chairman said he knew no better organisation for that purpose than the present Chambers of Commerce.

The proceedings then terminated.

TWENTY-THIRD ORDINARY MEETING.

Wednesday, May 20, 1863.

The Twenty-Third Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 20th inst., William Hawes, Esq., Vice-President, in the chair.

The following candidates were proposed for election as members of the Society:—

Angell, Lewis	8, Middleton-terrace, Merton-road, Wandsworth, S.W.
Craig, John	20, Parade, Harleyford-road, Vauxhall, S.
Downes, Thomas Ring	1, Park-cottages, Adelaide-road, Haverstock-hill, N.W.
Elderton, Edward M.	28, St. George's-square, S.W.
Elliott, John	2, Finsbury-pavement, E.C.
Farthing, J. Johnson	36, Great George's-sq., S.W.
Waine, William	Newington-butts, S.
Walker, Thomas	Speedwell House, Birmingham.

And as Honorary Corresponding Member,

Newbery, Joseph Vickers. Shanghai, China.

The following candidates were balloted for and duly elected members of the Society:—

Alexander, Rev. D. M.	Oldham.
Astles, Frederick W.	The Laurels, Smethwick, near Birmingham.
Cardwell, Thomas	8, Up. Hyde-park-gardens, W.
Dean, Alfred William	32, Queen's-road, Regent's-park, N.W.
Dickson, J.	66, Tollington-road, Holloway, N.
Dorling, Henry	62, Warwick-square, Pimlico, S.W.
Tucker, B. R.	3, Albert-terrace, Charlton, Dover.

And as Honorary Corresponding Member,

Lombard, Edouard Auguste, Genève.

The Chairman said that as there were so few members present, owing probably to its being the evening of the Derby day, he would suggest that it would be better that the paper announced for that evening should be postponed to the next meeting.

This proposal appearing to meet with the approbation of the members present,

The Secretary announced that on Wednes-

day evening next, the 27th inst., the paper by Mr. B. H. Paul, Ph.D., "On Destructive Distillation, Considered in Reference to Modern Industrial Arts," would be read.

ON THE DISCOVERY OF THE METAL THALLIUM.

The following Lecture, by Mr. William Crookes, was delivered at the Royal Institution, on Friday, March 27, 1863:—

So many brilliant discoveries have been announced to the world in this theatre, that it was with some diffidence I acceded to the request of the learned secretary of this Institution to relate to you to-night the history of the discovery of thallium. The discovery of a new metal is no novelty in this century. Since its commencement our acquaintance with the material world has been enlarged by the discovery of no less than thirty-two of these elements, and the particular and especial interest with which the three latest additions are regarded attaches as much perhaps to the means by which their existence has been revealed to us as to the metals themselves.

Some of the bodies called metals have been known as such from the earliest times. We have no record nor knowledge of the first discovery of the seven ancient metals—gold, silver, iron, copper, mercury, lead, and tin. I may remark, however, that they are metals which are either found native, or such as are easily separated from their ores by the agency of heat alone, or by the simplest chemical means. Of the rest I may briefly say that a large majority were first discovered by the employment of what I may call exclusively chemical methods. The exceptions to this rule are those whose discovery makes the early part of this century a marked epoch in the history of chemistry and of this Institution. These are the alkaline and earthy metals first obtained by Sir Humphrey Davy by means of voltaic electricity. I need not detain you now by dilating on the great impulse which the employment of this force in the decomposition of suspected metallic compounds gave to the progress of chemistry, and the fruitful results which have attended its use. No means have been attended with such brilliant and useful results until the researches of Bunsen and Kirchhoff definitively applied spectrum analysis to the recognition of elementary bodies.

You have heard and seen so much of the spectrum this season, that it might almost require an apology for introducing the subject once more, were it not that the discovery of thallium is inseparably associated with this method of analysis.

I may here point out one peculiarity with regard to the metals discovered by this method. It is this:—That whereas in the case of most bodies discovered in other ways some compound of them was known, and the metallic nature of the base was suspected; or some particular reaction had before convinced the discoverer that he had a body endowed with hitherto unrecognised properties in his hand; yet, in the case of spectrum analysis, no knowledge or suspicion of the metals themselves, or of any compounds, existed until, as I may say literally, they were first brought to light. The fact of their existence then flashed upon us at once.

A curious historical parallel may be mentioned in connection with the discovery of thallium, and here I must ask to be excused a more frequent use of the pronoun I (which I make with reluctance, and to avoid periphrasis) than is generally heard in lectures of this kind.

The discovery of thallium is strictly analogous to that of selenium by the great Swedish chemist, Berzelius.

In each case the original source was some residue from a sulphuric acid manufactory burning pyrites. From some unexplained reaction the presence of the rare element tellurium was suspected. Further examination led to the discovery, by Berzelius, of the element selenium, whilst in my own case the result of the investigation was the discovery of thallium.

Had spectrum analysis been known at the beginning of this century, there is no doubt that Berzelius would have added thallium to the other elements which he was the first to isolate, for I do not hesitate to say that without this powerful means of research thallium would have remained unknown at the present time. The residue was from a manufactory at Tilkerode, in the Harz, and had been placed at my disposal, in 1850, by Professor Hofmann, for the purpose of extracting the selenium from it. This was effected in the ordinary way, and the crude selenium was purified by distillation in hard glass retorts. A considerable residuum was left behind in this operation, and as a few tests seemed to show that tellurium was present in this residue, it was set aside for further examination. Early in the year 1861, happening to require some tellurium for experimental purposes, I sought for this residuum, and examined it more minutely for this element, but without getting very definite results. The chemical tests seemed to give contradictory evidence, when, not succeeding in meeting with tellurium where there were many chemical reasons for suspecting its presence, I had recourse to the spectroscope. I expected to see a system of fine, nearly equidistant, bands of light and shade traversing the spectrum, but instead of this a single brilliant green line flashed across the field of view. [The spectrum of thallium was here projected on the screen, its remarkable green band appearing like an incandescent bar upon a perfectly dark background, the metal being placed between the carbon poles of a forty-cell Grove's battery.]

The chemical treatment through which the substance examined had passed was such as to preclude the possibility of other than the elements antimony, arsenic, osmium, selenium, or tellurium being present, and I well knew that none of these bodies gave a spectrum in any way similar to this. I was therefore convinced that a hitherto unrecognised element was present, and at once devoted myself to the task of isolating it. It would weary you were I to recount the numerous experiments made with this object. The whole amount of the original seleniferous deposit which I had at my disposal was not more than three pounds in weight, and later analysis have proved that the total quantity did not contain more than three grains of thallium. The invaluable assistance afforded by the spectrum test at last enabled me to announce definitely* that I was dealing with a new element, and to give a sufficient number of its reactions to show that its chemical properties were well marked and perfectly distinct from those of all other known bodies.

At first I had doubts as to the chemical position of the new body, and, arguing from the reactions I had then ascertained, I was rather inclined to class it amongst the metalloids or semi-metals. After some months' labour, Dr. Thornthwaite, in the most generous manner, placed at my disposal two cwt. of sulphur, likewise containing about one grain of thallium per pound. With this I was enabled to prosecute my experiments, and before long had isolated the metal not only in the form of a black powder by the action of zinc, but in distinct metallic crystals by voltaic precipitation; all doubt as to the actual metallic character of the element now disappeared.

I had already decided upon a name for the new body.† With the assistance of a friend, a skilful linguist, the word thallium was chosen, from the Greek θαλλὸς (a green twig), which seemed to recal the green line of its spectrum, and to be adapted for the requirements of chemical nomenclature better than malachium, smaragdinum, viridium, and others which were thought of. The name

* *Chemical News*, iii. 191. † Ibid., iii, 303.

thallium was at once adopted by the scientific world as appropriate.

Whilst speaking of the metallic nature of thallium, it becomes a duty no less than a pleasure to mention that M. Lamy, a very skilful Belgian chemist, who had been fortunate in meeting with a rich source of the new body in May last, has, independently of my own researches, determined its metallic nature, and obtained it in considerable quantity. M. Lamy's specimen of thallium was exhibited to a large meeting of scientific gentlemen of all countries soon after the opening of the International Exhibition, and naturally excited great interest among them. It was afterwards placed in the Exhibition building, where, however, amid the splendours with which it was surrounded, it scarcely attracted the notice it deserved.

I first obtained the metal in crystals by voltaic action in September, 1861,* and, although I have since witnessed the operation many hundreds of times, I know of no other experiment of a similar kind which can at all compare with it in beauty.

I have arranged on the table a small apparatus in which the crystallisation of thallium is now proceeding under the influence of two or three cells of Grove's batteries. By the end of the lecture I have no doubt you will find that the bottom of the dish will have become almost covered with beautiful metallic crystals.

In order to render this visible to all my audience, I have placed some of the same solution of sulphate of thallium in a small glass cell containing the platinum terminals of two Grove's batteries. I will endeavour to project an image of these poles on the screen by means of the electric microscope, during electrolysis. In an experiment of this kind, in which I cannot detain you many minutes, some of the beauty and delicacy of the forms must necessarily be sacrificed to rapidity of crystallisation; but still I think you can all see the slender branches and fern-like vegetation in which the metallic crystals are shooting across the liquid.

Thallium comes down with such ease from its solutions under voltaic influence, that I now invariably adopt this plan for reducing it in the first instance, in preference to precipitating it with metallic zinc.

In order to obtain the metal in the coherent form, it is now only necessary to squeeze it together and fuse it under cyanide of potassium, when it is obtained in the form of an ingot.

Hitherto I have been working under great disadvantages, owing to my small stock of materials; each experiment requiring nearly the whole of my scanty store, which had then to be worked up again into an available form for the next experiment, causing great and unavoidable sacrifice both of time and material. Thanks, however, to the munificence of the Royal Society, my investigations will no longer stop for want of material, and I am now in communication with Mr. Spence, one of the largest burners of thalliferous pyrites in this country, who has, in the most handsome manner, offered to alter his flues, so that the greater portion of the thallium, which is now lost in the sulphuric acid, may be saved.

And now, having finished the history of the discovery of thallium, I shall follow the plan usually adopted in describing metals. And first as to the source. Up to the present time, the only available one is iron pyrites, such as is used largely, both in this country and on the continent, for making sulphuric acid. I have here before me a few specimens of one of the richest thalliferous pyrites which I have yet met with. It is brought from Belgium, and is largely used, both here and abroad, in the manufacture of sulphuric acid. The mineral being burnt in properly-constructed furnaces, the volatile products of its combustion are passed into large leaden chambers, where the sulphurous acid is mixed with nitrous vapours and steam, and becomes converted into sulphuric acid. Now, when the sulphur of the iron pyrites is burnt the product is a gas, and when the thallium contained in the pyrites is burnt the product is a volatile solid. By reason, however, of the great excess of sulphurous acid, and its high temperature (owing to the proximity of the leaden chamber to the furnace), nearly the whole of the thallium is carried through into the lead chamber, where it dissolves in the dilute sulphuric acid, forming sulphate of thallium, a soluble salt. In this case the thallium is lost, for it would be a most tedious and expensive operation to extract it from the acid, which, indeed, is no richer in thallium than the original ore. Thallium may, however, be readily detected in many samples of crude oil of vitriol, as well as in commercial products and chemicals which are made from it. Thus, the very common yellow hydrochloric acid, worth about 1d. per lb., often contains it. I have here a bottle of this acid, obtained from Messrs. Chance, Brothers, of Birmingham, and in this tube [exhibiting a specimen tube] I have a lump of pure metallic thallium, which I prepared from 1 cwt. of the acid. Owing to the imperfect means adopted to isolate the metal much of it was lost, but the piece actually obtained weighs upwards of five grains.

Let me also draw your attention to some of the other thalliferous substances which are on the table before you. Here is a fine specimen of cake-sulphur, some sulphide of cadmium, metallic cadmium, and metallic zinc, all from Nouvelle Montagne; a large ingot of Spanish copper; some sulphur, also from Spain; specimens of bismuth ores, with precipitated carbonate of bismuth, also thalliferous, recently purchased at a druggist's; commercial sulphate of copper, some pieces of selenium, and a quantity of metallic tellurium, in which thallium is present rather largely. There is also a large collection of thalliferous pyrites from all parts of the world, and a small specimen of native sulphur from Lipari, said to contain selenium, but which I have found so rich in thallium that it deserves to be classed as a new mineral.*

I have given you a brief outline of the path followed by the thallium in most of our sulphuric acid works. Fortunately, in some manufactories a slight modification is adopted, which permits of the accumulation of this metal in the flues. Instead of the sulphurous acid, &c., going direct from the furnace into the lead chambers, it passes through a greater or less length of flue, where the temperature becomes lowered sufficiently to deposit much of the thallium and other solid volatile matter (*e.g.*, mercury and arsenic) which it may contain. In this flue-dust, as it is called, I have frequently detected thallium, and in some instances in sufficient quantity to render its extraction well worth undertaking. In M. Kuhlmann's works at Lille the products of combustion of the pyrites are passed first into a supplementary chamber, where they are cooled down, and deposit nearly the whole of the thallium, arsenic, &c., before entering the converting chambers. This accounts for the richness of the deposit employed by M. Lamy for his researches.

The richest pyrites which I have yet examined have yielded me no more than ten ounces of thallium to the ton of ore. This may seem too minute a proportion to be worth noticing; but in 1,000 tons it amounts to nearly 6 cwt., and as 8 or 10 tons of ore are burnt daily in some of our largest vitriol works, I do not think I was exaggerating when I said, nearly a year ago, that

* At the Lecture I inadvertently said 1862 instead of 1861. —W. C.

* This was a small mineralogical specimen obtained in 1861 from Mr. Sowerby, geologist, Strand. It was labelled "Sulphur coloured with selenium, from Lipari," and consisted of very dark-coloured crystallised sulphur mixed with chloride of ammonium. Analysis showed that selenium was absent, but that it was very rich in thallium. Notwithstanding my repeated endeavours, I have hitherto failed in obtaining a further quantity of this mineral; a fine specimen of native sulphur which Dr. Hofmann most obligingly obtained for me direct from Lipari having been found quite free from thallium.—W. C.

thallium was in some works being thrown away by the hundredweight, the whole of which might be saved if manufacturers could be induced to modify their flues so as to effect its proper condensation.

Through the kindness of Professor Chandelon, of Liège, two tons of thalliferous pyrites from the Société Anonyme de Rocheux et d'Oneux, Theux, were placed at my disposal. After considerable delay, this arrived at my laboratory in September last, and from that time almost to the present I have been constantly engaged in extracting the thallium from it.

The first operation consists in breaking up the pyrites into lumps the size of a walnut, and distilling the sulphur from it. For this purpose hexagonal iron pipes, closed at one end, are arranged in a reverberating furnace, five at a time, so that the flame can lick round and raise them to a bright red heat. Each retort contains 20 lbs. of mineral, and has an iron tube receiver luted on to the end of it. After some hours' heating the operation is terminated, and the receivers contain from 14 lbs. to 17 lbs. of dark green or grey-coloured sulphur from each cwt. of ore. This appears highly thalliferous when examined by the spectrum test, but when treated chemically I have not succeeded in obtaining a larger yield from it than ten grains of thallium per pound of sulphur.

The separation of the metal from this sulphur is a matter of some little difficulty to one unprovided with the resources of a manufacturing laboratory. Indeed, I should have been quite unable to show you such pieces of thallium as I have here to-night, had not Messrs. Hopkin and Williams, the well-known manufacturing chemists, undertaken to perform the subsequent operations in their well-appointed works at Wandsworth. In less time than it used to take me in my private laboratory to work up ten pounds of sulphur, they have prepared for me the chloride of thallium from two cwt. The process adopted is briefly as follows:—The sulphur is powdered and boiled in a large iron pan with a solution of caustic soda until it has all dissolved, with the exception of a black precipitate suspended in the liquid. After cooling, it is filtered, washed, and the precipitate boiled in sulphuric acid. When all has dissolved that will, it is filtered, and hydrochloric acid is added to the filtrate, which determines the formation of the difficultly soluble protochloride of thallium. This is filtered off, washed once with dilute hydrochloric acid (in which it is less soluble than in pure water), and converted into sulphate. From the solution of this salt the metal is precipitated by voltaic electricity, as is now in operation on the table.

In order to obtain this spongy thallium in the coherent form it is not even necessary to fuse it. There is in this bottle of water a quantity of metallic sponge—the results of this day's precipitation in my laboratory—I merely have to knead it into a lump between my fingers, and then put it into a steel crushing mortar, without even taking the trouble to dry it. I now submit it to powerful pressure in this vice, and you see that I have produced a brilliant metallic-looking ingot, perfectly solid, as can be told by the sound when thrown upon the table.

Well, now, having obtained the thallium, let me draw your attention to its chief characteristics, wherein it agrees with or differs from its fellows. It is a white, opaque metal, endowed with a perfect metallic lustre, as may be seen at the close of the lecture by examining the beautiful crystals now being deposited all over the bottom of this dish. Metals are usually divided into two classes, light and heavy; thallium certainly belongs to the heavy metals, not only on account of its specific gravity, which is 11·9, a trifle higher than that of lead, but also for other reasons which I shall come to presently. It is very malleable, and may readily be rolled into leaves as thin as tissue-paper, as shown by the specimen of foil before you. It is not very ductile, and can only be drawn into wire with great difficulty. By employing pressure, however, thallium wire can be made with the utmost facility. I have here a small hollow steel cylinder, with a piston fitting tight into it: at one end is a very fine hole, and upon filling the cylinder with thallium, and forcing in the piston by means of the vice, the thallium issues out through the fine hole in the form of wire. I have arranged an apparatus here by which the wire as it issues from the cylinder is conducted along a glass tube into a specimen bottle, a current of dry carbonic acid passing through the apparatus all the time. By means of the electric light I project the image of the specimen bottle on to the screen, and by giving one or two turns to the screw of the vice you perceive the wire issuing forth and curling up in folds like a thick rope. The bottle is now filled with the coil of wire, and if I cement the stopper in, the specimen will preserve its metallic lustre and brilliant surface unchanged.

Thallium is very soft, in fact it is the softest known heavy metal, being only exceeded in this respect by the alkali metals. A piece of lead scratches it, as you perceive, with the utmost facility, without itself receiving an appreciable impression. It also possesses the property of welding together in the cold by pressure. I can illustrate this by taking another steel cylinder and filling it with several pieces of metallic thallium. [Fourteen pieces were put in.] A turn of the vice forces it out, as you see, into one solid rod, which, upon examination, will be found just as continuous and coherent as that made from one lump.

Thallium marks paper like plumbago, forming a streak having a yellow reflection. The mark almost entirely fades out in a short time from oxidation. A week ago I wrote a word upon this sheet of paper; upon close examination I can just read it, but I do not think it is visible to any one else. I have, however, merely to pass over it a sponge which has been dipped into sulphide of ammonium, when the word "thallium" appears black, and visible to all.

The electrical conductibility of thallium has been recently examined by Dr. Matthiesson, to whose instruction I am indebted for the wire-working process just shown. He finds it near lead in this respect. His researches were communicated to the Royal Society a few weeks ago.

The magnetic relations of thallium are very interesting. Professor Faraday has been good enough to arrange an experiment by which its behaviour under the magnetic force can be rendered clearly visible to all in the room. A small sphere of thallium is fastened to the short end of a light wood lever, a square index of white paper being at the other extremity. The lever is suspended horizontally by some long threads of cocoon silk in such a way that the sphere all but touches one of the conical poles of the large electro-magnet belonging to this Institution. I now pass the current of forty Grove's batteries round the electro-magnet, when you see, from the large arc travelled over by the paper index, how violently the thallium sphere is repelled from the pole of the magnet. It is, in fact, next to bismuth, the most diamagnetic metal known.

Thallium is easily fusible, melting at a temperature of 555° Fah.; at a full red heat it may be distilled, but it begins to evolve vapours at a lower point. If I heat a piece on charcoal before the blowpipe, you perceive the metallic vapours flying off copiously, colouring the flame a rich green. The colour which it communicates to flame is better shown by holding, in a colourless gas flame, two or three platinum wires having an alloy of thallium and platinum fused on to their ends. I will place by the side of this other two flames coloured respectively with barium and copper, when you can judge of the extreme richness and purity of the thallium green by the manner in which it appears to kill the others.

Thallium burns brilliantly in oxygen, and small fragments of the metal also take fire when thrown into a gas flame, giving rise to an intense green light. Exposed to the air it tarnishes very quickly; indeed, with almost the

rapidity of alkali metal, becoming coated with a film of oxide, yellow at first, and gradually darkening. This oxide is tolerably soluble in water, forming a highly alkaline solution. It, however, differs radically from potash and soda, and closely approaches oxides of silver and lead (which are likewise soluble and alkaline) in having scarcely any affinity for water; it being rendered anhydrous even at the ordinary temperature in a vacuum. I can illustrate the alkaline character of its oxide by taking this ingot of thallium, and rubbing a piece of moistened turmeric paper on a white plate. Wherever the thallium has touched a brown mark is produced. If I apply the tarnished surface of the metal to the tongue it tastes very caustic and biting, and somewhat metallic. When I place a piece of tarnished thallium in water, the superficial film of oxide dissolves, and exposes a bright surface of metal. Hot water cleans it at once, and renders the surface crystalline, like tin-plate washed with acids. If the thallium be quite pure, and the water free from air, no sensible action appears to be exerted on the metal, but when exposed to the joint action of air and water it is gradually oxidised. Curiously enough alcohol acts upon it more than water does. The soluble oxide (the protoxide) is also formed very rapidly when thallium is melted in the air; it then fuses like litharge, and is absorbed in the same manner into a bone-ash cupel. When thallium burns in oxygen a peroxide is formed.

Thallium dissolves in acids, its proper solvent being nitric acid; it forms two if not three basic oxides and an acid oxide. The salts of the protoxide are the only ones which have been much studied. They are well-defined series, most of them being beautifully crystalline. Many of these compounds have been very skilfully investigated by MM. Lamy and Kuhlmann, jun. Some of the proto-, sesqui- and per-salts are on the table, as also one or two thallates. Let me especially draw your attention to the beauty of the crystallised sulphate, nitrate, and chlorate of the protoxide, the yellow sesquichloride in glistening spangles, and this large bottle full of the protochloride, upwards of a pound in weight.

On the table before me I have arranged three series of test glasses, the upper row containing protosulphate of thallium, the middle row nitrate of silver, and the bottom acetate of lead. To these I will apply the ordinary tests used in chemical analysis, and I think there is no doubt that my chemical friends who are present will admit with me that the true position of thallium is by the side of these two metals, and not, as M. Dumas and other French chemists affirm, in the potassium and sodium group.

Gas light not being very well adapted for showing shades of colour, I have arranged to illuminate the table with electric light during these tests. I first add hydrochloric acid to the solutions, a white precipitate falls in each case; the protochloride of thallium being scarcely distinguishable from chloride of silver; it is, however, slightly soluble in water. Iodide of potassium gives a yellow precipitate with each metal. Bichromate of potash a yellow precipitate with thallium and lead, and a red one with silver. Sulphocyanide of potassium gives white, and sulphide of ammonium black precipitates in all three metals. Bichloride of platinum produces an insoluble double salt with thallium, and precipitates the silver and lead as chlorides. Ammonia produces no change in the thallium solution; gives a precipitate with silver, which redissolves in excess, and permanently percipitates the lead salt. Sulphuretted hydrogen has likewise no action on the thallium salt, but precipitates the other two. When, however, I add ammonia to the thallium after addition of the sulphuretted hydrogen, a black precipitate is produced, and finally sulphuric acid produces (of course) no change in sulphate of thallium, a slight crystalline precipitate in nitrate of silver, and a dense white one in acetate of lead. From these tests you therefore perceive that whilst the similarities between the three metals are very great, there are, nevertheless, characteristic differences, though not greater than between most nearly allied metals.

I have only time to show two reactions with solution of sesquichloride of thallium; the first is the precipitation of the slightly soluble protochloride upon addition of sulphite of soda, and the second the formation of a brown peroxide and precipitation of protochloride in crystals upon addition of ammonia. This latter reaction is a very curious one.

Let me, in conclusion, say a few words respecting the position of thallium amongst elementary bodies. In classification observers generally err in regarding natural bodies as so many lengths in a perfect chain, and facts are frequently strained in order to make them agree with this preconceived opinion. In such a group as chlorine, bromine, and iodine, we have, doubtless, three consecutive lengths; but most frequently Nature should be looked upon more as a perfect net than a perfect chain. In seeking for the chemical relationships of thallium, it is found that this metal occupies a somewhat anomalous position, being well described by an eminent French chemist as the ornythorynchus of metals. At first sight it might appear to belong to the group of alkali metals, on account of its forming a readily soluble, highly alkaline oxide; it likewise forms an insoluble platino-chloride, which also renders it analogous to some of the alkali metals, although not to others; but, on the other hand, its physical characters, its chemical reactions, and its high atomic weight (about 203), prove incontestably that the true position of thallium in the scale of elements is close to lead and silver.

In these utilitarian days a discoverer must be prepared to give some kind of answer to the question,—"What is the use of it?" Now, the possible uses of a body depend chiefly on its abundance, and as soon as thallium is procured by the ton at no greater cost than it is now by the ounce, it will certainly be utilised in many directions. In the pure metallic state it probably tarnishes too readily, and is too quickly acted upon by atmospheric agencies for it to possess much practical value in this form. In the form of alloy, however, its uses are likely to be very great, as it readily mixes with many metals, and communicates to them valuable properties.

The magnificent green which it communicates to a flame at once suggests a valuable application of thallium for pyrotechnic purposes. At the ordinary temperature of flame, the thallium light is absolutely homogeneous, and even at the high temperature of the electric arc, the other lines, which Dr. Miller has shown are produced, and which I have attempted to copy on this diagram, fade before the brilliancy of the characteristic green line.

Perhaps the best way for me to show the magnificent green light evolved by incandescent thallium vapour is by projecting on the screen the highly-magnified image of the thallium electric arc. I have scooped out the lower carbon of the electric lamp into the form of a small cup, and, upon placing ten or a dozen grains of thallium in it, and making contact, the upper pole can be separated for a space of an inch or more, voltaic connection being maintained by the bridge of thallium vapour rising from the cup. The image of this on the screen fills up a space of twelve inches or more with absolutely monochromatic green light, and if I introduce into this green space variously-coloured bodies, a bouquet of bright flowers, or even my own face, you will see the strange changes it produces in the apparent colours of bodies, everything being either green or black, just as in the sodium flame every object is yellow or black.

The reason why the homogeneous light given by sodium and thallium is so intense is owing to all the luminiferous energy of the element being concentrated into one ray, instead of being diffused over different portions of the spectrum.

These experiments show that thallium is pre-eminently the pyrotechnic element; but regarded for the present merely from a scientific point of view, its early history will always be looked upon with interest, as proving the beauty and accuracy of spectrum analysis, and the striking manner in which the deductions therefrom have been confirmed.

TELEGRAPHING BY SOUND.

Telephonography is the word which Dr. J. B. Upham, of Boston, Massachusetts, now chief of the Stanley General Hospital, Newbern, N.C., applies to a system of signalling by sound, which for some months he has been engaged in bringing to a form for practical use in the army and navy. Great embarrassment has occasionally resulted in the concerted operations of our forces which have been attempted in thick or foggy weather, from an inability to communicate by the common signals of flags or lights. It is well known that telegraph operators very speedily learn to read messages by "the click of the machine," without the necessity of looking at the recorded marks. This fact suggested the practicability of communicating messages by sound. More than a year ago Dr. Upham obtained, by the courtesy of Eastern Railroad officers, the use of two locomotives for the purpose of an experimental talk by the sounds of the steam whistle. One engine was placed near the station in Boston, and the other ran out to "Prison Point," Charlestown. The day was foggy but still. An alphabet to be used was agreed upon, and an expert telegraph operator was placed at each steam whistle. There was not the slightest difficulty in communicating, and questions and answers were recorded by both parties and compared. To remedy the very unpleasant ear-splitting sound of the common steam whistle, Dr. Upham has attached to it several contrivances in the form of a bell, of a French horn or trombone, or a reed fixture like a clarionet. These instruments can be made to give a very loud sound by a pump for forcing air, which can be easily moved from place to place. Dr. Upham has lately made many experiments with trumpets in the field, on foot, and on horseback—in row boats on the river Neuse, and with the steam whistle on the railroads and steamboats—and finds no difficulty in transmitting with trumpets any message, however long or complicated, the distance of a mile, or with the steam whistle the distance of three miles. Ample facilities for these experiments have been given by General Foster, in the way of furnishing men, engines and boats, and the results reached are considered of great prospective value.—*Boston, U.S., Journal.*

INTERNATIONAL POSTAGE.

The Paris correspondent of the *Times* says:—A meeting of the congress appointed by the different European Governments for the purpose of establishing a general system of international postage was held on Monday, at the Hotel des Postes, consisting of the following members:—For Austria, M. Löwenthal, Councillor of the Ministry of Commerce; Belgium, M. Fassiaux, Director General of Railways, Post Offices, and Telegraphs; Denmark, M. Martin Levy, Secretary of the Danish Minister of Finance; Spain, Count de Nava de Trajo, Sub-Director at the department of Foreign Relations in Spain; United States, Mr. Kasson, Deputy Postmaster-General of the United States, and Mr. Mohle, Assistant; France, M. Vandal, Councillor of State, Directeur Général des Postes, and M. Maurin, Head of Foreign Correspondence at the French Post-Office; Great Britain, Mr. F. Hill, Secretary to the General Post-office; Italy, Chevalier Pagni, Inspector-General of Italian Post-offices, and Chevalier Agostini, head of section in that department; Holland, M. J. Hofstede, Inspector of the Central Dutch Post-office; Portugal, Chevalier d'Autas, Councillor and Secretary of the Legation at Paris; Prussia, M. Metzner, Superior Councillor of the Post-office at Berlin; Sandwich Isles, Sir J. Bowring; Switzerland, M. Kern, Swiss Minister-Plenipotentiary at Paris, and M. Paul Jeanrenaud; Hanse Towns, M. Johannes Rosing, Secretary of Legation. The object of the congress is to introduce, not only a uniform system of payment, but of weight and general postal legislation, and to turn to account, in the general correspondence between civilized nations, such improvements as have been found practicable and useful.

Home Correspondence.

LIGHTING RAILWAY TRAINS WITH GAS.

SIR,—Perhaps you will permit me to make a few further observations in explanation of my own views of the difficulties to be overcome in the lighting of railway trains with gas, as well as to answer some of the remarks made at the meeting of the Committee of Reference on Mechanics and Engineering.

The pioneers in this country, in the construction of apparatus for compressing gas, and using it in in a portable form, were, Thelluson, Gordon, and Heard; and more recently in France, a system has been adopted of supplying rich portable gas, which has extended itself to various other important towns on the Continent, and with a very fair amount of success. There are companies established at Paris, Milan, Turin, and Moscow, their object being chiefly to supply gas to those parts not within the range of the ordinary gas companies' mains, so that they do not act antagonistically to them. M. Hugon, of Paris, is more or less at the head of each of them, he being the gentleman whose mode of production, compression, and regulation of the gas, has been adopted. In America, the steamboats and some of the railway trains are lighted with gas made on the boat or train, as well also as by the means which have so frequently been tried in this country.

Thompson and one or two others have been tolerably successful in the lighting of railway trains, but it may be presumed that their systems have many objections, or railway companies would assuredly adopt some such plans of lighting their carriages, which for many self-evident reasons are preferable to oil; indeed, Mr. Teulon, by his remarks, and as representing the railway interest at the meeting of the Committee, clearly showed that while he was thoroughly acquainted with what had already been done, yet that the result, so far, was anything but satisfactory, at least not so much so as to warrant the companies adopting it generally.

I am aware that the gas, as delivered at the houses of customers at Paris, which is stored in reservoirs at five atmospheres pressure, is readily regulated from that pressure down to that which is necessary for being properly burnt—say equal to a column of water five or six-tenths of an inch in height, but the means by which that is accomplished there cannot be made available for lighting railway trains with gas.

I venture to say that there are considerable difficulties to overcome before a proper system of lighting railway carriages, as we now find them, and for long distances, can be successfully brought into use.

The conditions which railway companies must have are:—

1. That but little room be taken up by the apparatus.
2. That the application be readily made to existing carriages at little cost.
3. That the light be better, and at less cost, taking everything into consideration, than lighting by oil.
4. That the apparatus be simple, and that each carriage be lighted independently of the others, so that they may be detached at pleasure, without putting the light out.
5. That the light last as long as the oil lamps, or say from London to York, Holyhead, Exeter, or Dover.
6. That it be as certain in its action, under all circumstances, and that defects be as readily corrected as by the present mode of lighting.

The plan adopted at the Metropolitan is not generally applicable, and only for such an exceptional line of railway as it is; for, to use gas at the mere pressure of that which is necessary for burning it, would require for the journey between London and York, half as much cubical capacity as the carriages themselves.

In order to fulfil the conditions I have named, the gas must be condensed to ten or fifteen atmospheres, and the difficulty is to reduce that pressure down to five-tenths of

an inch column of water, and to maintain it at such under all circumstances, so as to comply with the conditions I have stated, and the regulator must be entirely metallic. I am fully acquainted with all the published methods from the first introduction of gas-lighting, but not any of them comply fully with what railway companies must and will have before they generally adopt the principle of lighting railway trains with gas.

If I should succeed in accomplishing what I am trying to do, I will not fail to lay the result before the Society of Arts for discussion.

I am, &c., GEORGE BOWER.

St. Neot's, May 16, 1863.

SEWAGE OF TOWNS.

Sir,—I see that Dr. Thudichum, in his paper read before the Society last week, making allowance for daily and casual visitors, and for the rapid increase of the population of the metropolis, reckoned the human excretal matters as equal to those of about two million adult males, and takes the urine alone of these two million as worth about 10s. per head per annum. Reckoning that the supposed two million adults represent, in round numbers, three million individuals of both sexes and all ages, this brings the value of the urine per head of the actual population, according to Dr. Thudichum's data, to two-thirds of 10s., or 6s. 8d., which is exactly the value put upon the constituents of the mixed excreta (including fœces) of each individual of a mixed population, of both sexes and all ages, by Mr. Lawes and myself. Taking this valuation, from which Dr. Thudichum would obviously not widely differ, and reckoning that there are eighty tons of sewage per annum for each head of the population (some take it at more and some at less), this would give 1d. per ton for the *average* sewage of London, if valued according to the constituents of the human excretal matters it contains, taking these at the price they would command in the market if in the condition of a concentrated, dry, and portable manure, such as guano. Other matters, of course, add more or less to the value of the sewage, but their value bears but a small proportion to that of the human excretal matters.

But, in the discussion, Mr. Alderman Mechi claimed Dr. Thudichum's data as bearing out his own estimate of 16s. per head per annum, as given by him in his evidence before the Parliamentary Committee last year. This estimate, is, however, it will be observed, in point of fact, from twice to twice and a half that of either Dr. Thudichum or Mr. Lawes and myself. But Mr. Mechi went on to complain that his estimate of 16s. "was confronted by other evidence putting the value at only 2s. per head;" and as, in his recent lecture at the Farmers' Club, he complained that "Mr. Lawes puts it at 2s. per head," I suppose he again refers to the evidence of that gentleman. Now, I find by reference to the report of the Parliamentary Committee, that what Mr. Lawes said about 2s. per head was, that, in the experiments of the Royal Commission at Rugby, the result actually yielded, reckoned according to the milk obtained, was "about 2s. or 3s. per head." But when giving the value according to the constituents, he said, "The theoretical value, as far as we have got it, of each individual, is about 6s., putting that as the value of the ingredients bought as guano." Mr. Mechi must perfectly well know that it is this estimate of "about 6s." (and not the actual result of 2s. or 3s. in a particular case, when the 6s. or 7s. worth of constituents had been mixed with some 50 to 70 tons of water) that is alone fairly comparable with his own theoretical estimate of 16s. And, as the data of Dr. Thudichum, and those of Mr. Lawes and myself, given by Mr. Lawes in his paper before the Society, on March 7, 1855, are the most comprehensive brought to bear on this subject, and the estimates founded upon them are, so far as I remember, the only ones in which the questions of the sex and age of a mixed population have been duly considered in reckoning the theoretical value of the excretal matters, I am inclined to believe, and I think if Mr. Mechi carefully looks at the evidence he will agree with me in believing, that that value is much nearer 6s. 8d. than 16s. per head per annum.

But the theoretical value of the constituents contributed by the population to the sewage is one thing, and their actual value when distributed through an enormous bulk of water, as in dilute town sewage, is quite another; and Mr. Mechi has himself very recently spoken of a case (that of Croydon) in which the increased rental from the application of sewage represented only 1s. 1d. for each individual of the population, "as a very recent accessible and successful instance and evidence of the value of town sewage." In the early part of my remarks I have shown that, according to the data of Dr. Thudichum, and of Mr. Lawes and myself, the theoretical value of a ton of the *average* sewage of London is about 1d., so far as its contents in human excretal matters are concerned. Now, at Rugby, where, so far as can be judged from the evidence at present at command, the average of the total sewage does not differ very widely in composition from that of London, though as used, excluding much of the rain-fall, it is probably much stronger, the tenants who have it brought to hydrants in their fields, ready for application to either grass or arable land at pleasure, any day of the year, consider themselves very fortunate to get rid of it to others at 1d. per ton the year round. Yet it is maintained by some that farmers will be glad to pay at least 2d. per ton for sewage delivered to the boundary of their farms, with all the additional expense (by outlay of capital, or increased rental as the case may be) incident to laying down pipes over the farm, and the cost of actual distribution besides.

It certainly does seem a very great pity that any who are really anxious for the beneficial utilisation of the excretal matters of our populations, should indulge in exaggeration in their representations to the public in this matter, as nothing, surely, can tend more to postpone or prevent a satisfactory settlement of the question, than the circulation of vague and illusory statements respecting it. Indeed, so long as the value of the excretal matters of the average individual of a mixed population of both sexes and all ages is assumed to be the same as that deduced from the results of some high authority for an adult male; so long as the value of the constituents in a ton of average sewage is estimated according to the analysis of samples making no pretensions to be average samples; so long as it is maintained that the annual excretal matter of an individual of the population is equally applicable to grass land and to land under tillage, to succulent and to all other crops, and that it is to be valued by the same tariff, whether it be in the form of about half a cwt. of dry and portable powder, or distributed through from 50 to 100 tons of water, as the case may be; so long as the circumstances of a daily supply of enormously diluted sewage are spoken of as comparable with those of the liquid manure of a farm, which can be had and used in almost any state of concentration, and be applied at any time at pleasure; so long as the results obtained by irrigation in hotter and drier atmospheres are adduced as evidence of what may be expected under the influence of our own comparatively sunless summers, so long must it be concluded that it is thought not quite prudent to deal candidly with the public in this matter, and so long must this vexed question remain a source of contention, instead of what it should be, a subject treated exclusively according to the actual facts and merits of the case.

I am, &c.,

J. H. GILBERT.

Harpenden, near St. Alban's, May 20, 1863.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 1. Annual Meeting.
Tues. ...Royal Inst., 3. Prof. Tyndall, "On Sound."
Anthropological, 7. Prof. Busk, F.R.S., "Human Remains from Brick-earth near Chatham."

WED....Society of Arts, 8. Mr. B. H. Paul, "On Destructive Distillation, considered in reference to Modern Industrial Arts."
Royal Horticultural, 1. First Great Exhibition.
Archæological Assoc., 8½. 1. Rev. T. Owen Rocke, "On a Recent Discovery of Antiquities in Salop." 2. Mr. Powell, "On the Pedigree of Derwentwater of Castle Rigg."
THURS...Royal Inst., 3. Prof. Ansted, "On Geology."
FRI. ......Royal Inst., 8. Prof. Max Muller, "On the Vedas."
R. United Service Inst., 3. Lieut. P. H. Colomb, R.N., "Naval and Military Signals."
SAT.......Royal Inst., 3. Prof. W. Thomson, "On Electric Telegraphy."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May* 15*th*, 1863.]

Dated 8*th January*, 1863.

66. R. Grogan, 27, Hereford-road-north, Bayswater—New and improved propellers for vessels driven by steam or other power.

Dated 11*th February*, 1863.

369. H. Donald, Johnstone, Renfrew—Imp. in machinery for shearing, punching, and riveting metals.

Dated 18*th February*, 1863.

445. J. Platt and W. Richardson, Oldham—Imp. in machinery or apparatus for cleaning cotton from seeds.

Dated 17*th March*, 1863.

715. J. Cox, Georgie Mills, Edinburgh—Imp. in swimming baths, and in apparatus for swimming, part of which apparatus is applicable to sailing or moving vessels in a circle."

Dated 6*th April*, 1863.

871. E. T. Hughes, 123, Chancery-lane—Imp. in machinery or apparatus for manufacturing the ornamental tips of parasols, umbrellas, and similar articles. (A com.)

Dated 16*th April*, 1863.

960. A. Samuelson, 28, Cornhill—Imp. in the construction and arrangement of machinery and apparatus for the manufacture of oil.

Dated 17*th April*, 1863.

966. J. Goucher, Worksop, Nottingham—Imp. in steam boilers, and in regulating the admission of air into the furnaces of steam boilers.

Dated 20*th April*, 1863.

978. P. G. Rowell, 17, Castle-square, Brighton, and H. Holt, 14, Red Cross-street, Brighton, Sussex—A better and more economical mode of securing the bands of locomotive engine and tender springs, also a new method of applying the same.

Dated 23*rd April*, 1863.

1012. T. Richardson, Newcastle-upon-Tyne, and J. C. Stephenson, Durham—Imp. in the manufacture of sulphate of soda.

Dated 24*th April*, 1863.

1016. W. N. Wilson, 144, High Holborn, and J. G. Grey, 97, Cheapside—Imp. in machinery for sewing and stitching.

Dated 25*th April*, 1863.

1034. J. Dunbar, jun., and J. W. Woodford, 12, Sutherland-street, Walworth—Imp. in apparatus for steering and manœuvring ships and vessels.
1040. A. Legras, 64, Davies-street, Berkeley-square—Imp. in machinery or apparatus for making ices.

Dated 28*th April*, 1863.

1064. W. Clark, 53, Chancery-lane—Imp. in machinery for the manufacture of paper, and of various kinds of boards produced from fibrous substances. (A com.)
1066. J. H. Johnson, 47, Lincoln's inn-fields—Imp. in drying and cooling grain, and in the machinery or apparatus employed therein. (A com.)

Dated 29*th April*, 1863.

1082. M. Darland, Mount-street, Grosvenor-square, and E. H. Monckton, Cavendish Club, Regent-street—Imp. in apparatus for withdrawing milk from cows and other mammiferæ, and for conducting it when withdrawn to appropriate receivers. (Partly a com.)

Dated 30*th April*, 1863.

1090. E. Mitchell, Cams Alders-lodge, Fareham, Hampshire—Imp. in reaping and mowing machines.

Dated 1*st May*, 1863.

1098. W. G. Craig, Cannon-street—Imp. in feed apparatus for steam boilers. (A com.)

Dated 2*nd May*, 1863.

1100. T. L. Bissell, Charleston, North America—An improved apparatus for charging breech-loading cartridges.
1102. J. W. Gibson, 31, Lower Ormand Quay, Dublin, and W. Turner, Hammersmith Iron Works, Dublin—Imp. in springs to be used for railway buffers, draw hooks, and also for carrying springs of railway carriages and other vehicles.
1104. J. Purdey, Oxford-street Imp. in breech-loading fire-arms.
1106. J. B. Dubreuil, 108, Rue du Faubourg St. Denis, Paris—Imp. in carts, waggons, and other vehicles.

Dated 4*th May*, 1863.

1112. B. G. Sloper, Walthamstow, Essex—Imp. in apparatus for separating metals from earthy and other matters mixed with them.
1114. F. Applegate, Bradford-on-Avon, Wiltshire—Imp. in spring balances and pressure gauges.

Dated 5*th May*, 1863.

1118. E. Chesshire, Birmingham—Imp. in apparatus for intercepting the solid portions of the soil of water-closets.
1120. R. A. Brooman, 166, Fleet-street—A new fabric suitable for trimmings. (A com.)
1122. P. Bradshaw, Earls Barton Mills, Northamptonshire—Imp. in mounting or hanging mill stones for grinding grain and other substances.
1124. W. Glover, South Shields—Imp. in means or apparatus to facilitate the steering of ships and other vessels.
1126. S. B. Cochran, 48, Fleming-road, Kennington, Surrey—Imp. in sewing machines, and in apparatus connected therewith.

Dated 6*th May*, 1863.

1128. J. T. Ward, Swansea—Imp. in carriages.
1130. S. Hibbert, J. Lawton, and J. Kay, Manchester—Certain imp. in apparatus for cleansing potatoes, and in decorticating the same and other esculent roots.
1134. T. Beesley, Symond's-inn—Imp. in the construction of boxes or cases for carrying or packing bottles.
1136. C. W. Atkinson, 34, Montague-place, Russell-square—An improved steam or other motive power engine.

Dated 7*th May*, 1863.

1138. J. Park, Bury, Lancashire—Imp. in communicating motion to machinery for manufacturing paper pulp.
1140. P. Bourne, Whitehaven—Imp. in miner's lamps.
1142. A. Stanley, Walsall, Staffordshire—Certain imp. in the mode of finishing clasps and other such like metallic connectors, and which said mode of finish is also applicable to other purposes.
1144. T. Small, Bargate, Boston, Lincolnshire—Imp. in motive power machinery.

PATENTS SEALED.

[*From Gazette, May* 15*th*, 1863.]

May 15*th*.
3087. W. Dobson.
3093. J. Arbos.
3094. P. H. Klein.
3095. W. H. Burnett.
3096. E. P. Houghton.
3097. C. W. Harrison.
3098. C. Neild and J. Hopkinson.
3013. L. Lenzberg.
3105. J. Chalmers.
3108. J. Arbos.
3109. R. A. Brooman.
3116. C. Stevens.
3118. F. Fletcher.
3120. J. W. Child.
3121. F. Seiler.
3126. C. Hadfield and W. A. Attkins.
3132. T. Walker.
3138. S. Deacon and C. Deacon.
3251. R. D. Kay.
399. J. C. Jeffcott.

[*From Gazette, May* 19*th*, 1863.]

May 19*th*.
3127. J. Townsend.
3133. C. Wagner.
3137. C. A. Orth.
3139. A. Sutton.
3140. W. E. Gedge.
3141. W. E. Nethersole and C. Buckland.
3144. C. Powell.
3155. W. Tatham.
3159. A. L. Woolf.
3184. W. Clark.
3189. J. H. Johnson.
3193. W. Clark.
3207. Rev. H. Moule.
3221. P. W. Reuter.
3223. B. Oldfield.
3270. H. A. Bonneville.
3310. S. B. Whitfield.
3226. T. E. Vickers.
3383. E. Lepainteur.
3393. A. V. Newton.
24. E. Skull and E. Mealing.
253. J. Platt.
262. H. A. Bonneville.
458. N. Thompson.
517. F. A. Gatty.
521. W. Readman.
638. G. T. Bousfield.
716. W. E. Newton.
734. G. Haseltine.
770. G. Davies.
798. W. Blake.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, May* 19*th*, 1863.]

May 11*th*.
1226. W. Greeves.
May 12*th*.
1195. J. Higgins and T. S. Whitworth.
1235. J. Lees.
1382. G. Hadfield.
May 14*th*.
1193. G. H. Barth.
May 15*th*.
1225. J. D. Dunnicliff and S. Bates.
1300. G. De Laire and C. Girard.
May 16*th*.
1220. J. Cole.
1266. W. Clissold.
1270. T. Cope.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, May* 19*th*, 1863.]

May 12*th*.
1185. J. Wilkes, T. Wilkes, and G. Wilkes.
1267. W. E. Newton.
May 13*th*.
1513. A. Shanks.
May 15*th*.
1219. J. C. Pearce.
May 16*th*.
1178. G. Carter.

Journal of the Society of Arts.

FRIDAY, MAY 29, 1863.

WOOD CARVING.

EXHIBITION AND OFFER OF PREMIUMS.

The Council have had under consideration a communication from the Society of Wood Carvers, asking the aid of the Society of Arts in promoting the art of wood carving in this country, and they have agreed to allow the use of the Society's rooms for the purpose of holding an Exhibition of Wood Carving, both modern and ancient, in the month of June, 1863. The Council have further agreed to offer the Society's Silver Medal and to make a grant of £30, the Society of Wood Carvers giving £15, as a fund for prizes to be awarded to exhibitors on that occasion, in the following divisions, provided that in the opinion of the judges the articles possess sufficient merit, thus:—

First Division.

Human figure in alto or bas relief. Animals or natural foliage may be used as accessories.

1st Prize of £8 and the Society's Silver Medal.
2nd Prize of £4.
3rd Prize of £3.

Second Division.

Animal or Still Life. Fruit, flowers, or natural foliage, may be used as accessories.

1st Prize of £8.
2nd Prize of £4.
3rd Prize of £3.

Third Division.

Natural foliage, fruit, or flowers, or conventional ornament in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.

1st Prize of £8.
2nd Prize of £4.
3rd Prize of £3.

Employers or private owners may be Exhibitors, but *bona fide* workmen only can receive prizes.

The prizes are open to all Art workmen in Great Britain, whether belonging to the Society of Wood Carvers or not.

The judges will be selected as follows:—Four by the Council of the Society of Arts, and three by the Society of Wood Carvers.

All articles for exhibition and competition must be sent in to the Society's House on or before Monday next, the 1st of June, 1863, and must be delivered free of all charges. Each work sent in competition for a prize must be marked with the workman's name, or, if preferred, with a cypher, accompanied by a sealed envelope giving the name and address of the workman. With the articles, a description for insertion in the Catalogue should be sent.

Before the award of the prizes is confirmed, the Candidate must be prepared to execute some piece of work sufficient to satisfy the Council of his competency.

Although great care will be taken of articles sent for Exhibition, the Council will not be responsible for any accident or damages of any kind occurring at any time.

Prices may be attached to articles exhibited and sales made, and no charge will be made in respect of any such sales.

TWELFTH ANNUAL CONFERENCE.—NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The Twelfth Annual Conference of the Representatives of the Institutions in Union and the Local Educational Boards with the Council will be held on Friday, the 12th June, at Twelve o'clock, noon. Sir Thomas Phillips, F.G.S., Chairman of the Council, will preside.

Secretaries of Institutions in Union are requested to forward, as soon as possible, to the Secretary of the Society of Arts, the names of the Representatives appointed to attend the Conference. The Chairmen or other Representatives of the Local Boards of Examiners are invited to attend the Conference.

The Council will lay before the Conference the Secretary's Report of the Proceedings of the Union for the past year, and the Results of the Examinations of the Central Committee of Educational Unions. The time for holding the Society's Examinations next year will also be considered.

The following subjects are suggested for discussion:—

1. Whether in the Elementary Examinations, in addition to the uniformity already, to a great extent, secured by the supply of the same papers of questions to the various Local Boards, further uniformity may not be obtained by a plan for aiding the Local Examiners in the estimation of the Candidates' answers?

2. Whether it is desirable to dispense with the "Previous Examinations" in *special* subjects?

3. The propriety of the Society of Arts employing an Organising Agent to visit the various Institutions.

4. How far is it desirable and practicable to combine the objects of the Working Men's Clubs—viz., amusements, draughts, chess, refreshment, &c., with the educational objects of Mechanics' Institutes, and whether the members of Institutes can be retained during the summer, by providing healthful recreation and studies requiring illustration from nature?

5. The propriety of holding one or more meetings of Representatives of Institutes about the time of the Annual Conference at the Society of Arts, for the purpose of reading short papers or essays on various subjects of interest.

6. The expediency and means of establishing competitive exhibitions of the Works of Art Workmen and Skilled Artisans.

7. Whether it would be expedient that Apprentices should be examined, at the conclusion of their term, in the principles and practice of their craft or business, and Certificates granted to them?

8. Whether it would not be desirable for Institutions to give Testimonials to their members, and to keep registers of those so recommended by other Institutions?

9. The expediency of holding local competitions in Shorthand.

Notice of any other subjects which Representatives may desire to introduce to the notice of the Conference should be given to the Secretary of the Society of Arts, to whom should also be forwarded a copy of the last Annual Report of each Institution.

Representatives of Institutions and Local Boards attending the Conference are invited to the Society's Conversazione, at the South Kensington Museum, in the evening of the same day (12th June), and will receive cards on application at the Society's House on the day of the Conference.

CONVERSAZIONE.

The Council have arranged for a Conversazione at the South Kensington Museum, on Friday evening, the 12th June, for which cards have been issued.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following additional names have been received up to the 28th inst.:—

Aldam, William	£1	1	0
Hopkins, Evan	1	1	0
Perkins, Ainger March	1	1	0
Robinson, George	0	10	0
Rolls, R. H.	1	1	0
Villiers, Rt. Hon. C. Pelham, M.P.	1	1	0
Wilson, Lestock Peach	1	1	0

DWELLINGS FOR THE WORKING CLASSES.

With a view to promote enlarged investments of capital in model dwellings and other establishments for the benefit of the working classes, the Council of the Society of Arts has instituted a statistical inquiry into the results hitherto obtained, including family dwellings of every description, model lodging-houses, dormitories, refuges, baths and washhouses, soup kitchens, coffee-houses, &c.

Members and others who can supply information or indicate sources where it may be obtained, are requested to communicate with the Secretary, who will send blank forms for being filled up with the required data.

COMMITTEES OF REFERENCE.

THE COLONIES.

A Meeting of the Committee on the Colonies took place on Friday afternoon, 22nd of May, Sir Thomas Phillips, Chairman of the Council, in the chair.

The Chairman, in opening the meeting, remarked that the colonies were a subject of the greatest interest. The relation of the home government to the colonies, and the relation of the colonies *inter se*—the modes by which the productions of the colonies might be made known in this country, and by which that interchange might take place which was calculated to promote the interests of all parties—were topics which had often been considered in that room, and which might always be considered usefully.

Mr. Fitzgerald said, being a landholder in West Australia, and being anxious for the welfare of that colony, he might mention that he had been informed that there was a tree there which yields a gum called the "Black-boy gum," and this, when dissolved in spirits of wine, was used for colouring. He could procure a sample of this gum for the Society to examine if they thought it worth attention. Then there was the "red gum," a powerful astringent, and very useful in cases of diarrhœa. It was exhibited at the International Exhibition, but was but little known in this country. There were immense tracts of sandy land in West Australia, where one variety of the wild castor-oil plant grew, and he believed it was that on which the *Bombyx Cynthia* fed, which produced that rough kind of silk which came from the Burmese territory. That, also, he thought, might be brought before the consideration of the colonies by offering a premium for its production. He would mention that lately he sent a cwt. of Sea Island cotton to this colony to see how it would grow there. The seed was a portion of that captured at New Orleans by the Federal forces lately, and which he obtained from the Cotton Supply Association at Manchester. There was every reason to believe that the condition of that colony was such that cotton might be produced there at a lower rate than almost anywhere else. It was a question of labour, with which was mixed up the subject of coolie emigration.

Mr. P. L. Simmonds remarked that the black-boy gum or resin was a well known article of commerce, and was called by two or three different names. It yielded a yellow dye, and was used to a small extent by varnish makers, and also medicinally. In the colonies it had been tried for gas making and for other purposes, and he did not think anything could be dcne to stimulate its production more than had been done by the colonists themselves. The red gum had been spoken very favourably of in the colonies, and possessed valuable medicinal qualities. It was a good astringent. Another product was the West Australian mahogany, a series of *Eucalyptus*, which possessed remarkable properties for shipbuilding.

Mr. Ashworth remarked that it was rather more than a year ago that he had the honour to submit to this Society a paper entitled "Our Colonies, their Commerce, and their Cost," and seeing he was connected with commerce, he took it for granted that he had claims to be heard on the commercial aspect of this question. Our colonial affairs were largely mixed up with military, naval, ecclesiastical, judicial, and governmental matters, each of which was deemed exceedingly important. The commercial aspect ought not to be entirely overlooked, inasmuch as the expenditure for the colonies in this country amounted to a very large sum. It was not only necessary, but expedient, that we should now and then "take stock" (to use a commercial phrase) in regard to the expenses we incur in comparison with the advantages, or probable advantages, to be derived from the occupation of those colonies; in fact, the expenses attending our colonial management had already had the effect of raising in this country very important considerations as to the policy or impolicy of holding or abandoning our colonial possessions. He did not mean to say that the country had arrived at the conclusion that we should be better divested of our colo-

nies, but from what he had seen he believed their management required a much closer investigation than we had hitherto bestowed upon it. It was cheering to anticipate, at a time like the present, that from Queensland especially we were likely to derive a considerable quantity of very excellent cotton. It would have been gratifying if we could have seen that our West India colonies had promised favourably in the way of cotton culture. In those islands we had a very wide range of soil capable of producing cotton, if we knew how to use it. We had ceased to receive from that region any large amount of cotton for a long time back; and now, when we were casting about and considering in what manner the material could be supplied; when even the Sultan had become awakened to the advantages of cotton culture; when the people of Italy, Algeria, Paraguay, and other countries, had begun to take advantage of the inquiry for it, it was remarkable that, when public companies were formed here for its cultivation, they received very little support in our colonies. In Jamaica but little money had been subscribed for that purpose; but in Queensland more assistance had been given. Referring to the colonies, he found in a return moved for a few weeks since by Mr. Bazley, that the expenses incurred by the home government in the West India islands for governors amounted to £20,000, and that in the judicial department the cost was about £6,300 a year, whilst the ecclesiastical cost £20,700. All this was paid by the home government, and was irrespective of the amount paid for military purposes. In Canada we had a fearful picture of colonial misgovernment. Its population was about equal to that of Lancashire—something like 2,500,000—and the expenses we incurred to govern that people were enormous. A large portion of Lower Canada was peopled by a low description of French population, a class of people who divided and subdivided the land into very minute portions, and who had nothing to sell, and no money wherewith to buy. Mr. Ashworth then referred to the colonies as being unfettered in their commerce, and permitted to sell and buy wherever they pleased; and in reference to Canada he said that less than one-half of what they sold came to this country, and less than one-half of what they bought was sent from us. The Canadians were allowed to take charge of their own affairs, but they were very chary about serving as militia. They would not offend the Americans by placing themselves in a defensive attitude, and if anything was to be done for the protection of the country from foreign aggression it must be done at the expense of the mother country. He believed if we were to look back for the last fifty years, we should find our military expenses for Canada had been something like half-a-million a year. The Canadians argued that this expenditure was not incurred on their behalf, but that their country was made the receptacle for supernumerary soldiers, as they could be conveniently accommodated there, away from the sight of the British tax-payer. He thought these were characteristics of our colonial system which might properly be brought under the discussion of this Society; and if the Committee were disposed to take up questions of this nature, he should be ready to investigate the advantages and disadvantages which accrued to this country in regard to the commercial aspect of our colonial system.

Mr. FITZGERALD believed that the Manchester Chamber of Commerce last year were by no means unanimous in considering the colonies as incumbrances on the national treasury.

Sir THOMAS PHILLIPS being obliged to leave the meeting, the chair was, during the remainder of the discussion, occupied by Mr. WILLIAM HAWES.

The CHAIRMAN had heard only the latter part of Mr. Ashworth's observations, but he should decidedly object to the committee taking up the question politically. He knew Mr. Ashworth's views with regard to the colonies, and differed from them. The question of the cost of the colonies was matter of scarcely any moment at all compared to their enormous value to this country, and to the duty the country owed to those persons who had emigrated from our shores. He looked upon this expenditure as being for the protection of the Queen's subjects in her respective colonies. The object of this committee was to make suggestions which might help to develop the industries of the colonies, with a view to bringing before the people of this country the best fields open for them, and for the utilisation of a great variety of products, many of which were scarcely known.

Mr. ASHWORTH disclaimed that he took merely a political view of the colonies, remarking that his observations were on their commercial aspect.

Mr. FITZGERALD thought it would be very difficult to draw a line between politics and commerce, as regarded this question.

Mr. ASHWORTH conceived that after what we had done for Canada, that colony was not wise in raising its tariff against this country. A duty of 20 per cent. was a large tax to impose upon British manufactures, to a country which was year by year involving us in expensive government. Moreover, when we saw their tariff very often run parallel with that of the United States, we could not fail to imagine there was a species of harmony prevailing between the policies of the two countries. He thought this committee would do wisely to discriminate between those colonies which were acting in harmony with the mother-country and those which were not.

The CHAIRMAN agreed with Mr. Ashworth that it was a hard case that Canada should be allowed to put any amount of duty upon the manufactures of this country. But whether it arose through any sympathy between them and the United States, he was not prepared to say. It was a great disadvantage to our manufacturers, and he thought there ought to be a little more reciprocity in this matter.

Mr. BROOMHALL asked whether this high rate of duty was confined to Canada?

The CHAIRMAN replied that it was not. It was gradually creeping over all the colonies. Cape Colony, which had a duty of 5 per cent., had recently raised it to 7½ per cent., and he believed the same thing had been done in some of the Australian colonies.

Mr. BROOMHALL said that when he went to India, twenty-one years ago, the duty was 2½ per cent.; it was raised to 3½ per cent.; then to 5; and subsequently to 10 per cent.; so that the case of Canada was not an isolated one.

The CHAIRMAN said that in Canada the duty in some instances had gone up to 25 per cent. They must not, however, judge of the question purely by the rate of tariff. It was mixed up also with the question of taxation. It was clear if the colonists paid income taxes or assessed taxes, in lieu of taxes upon imports, it would affect the industry of the colonies nearly as much. The import duties were doubtless evaded to a certain extent along the extensive frontier of Canada.

Mr. BROOMHALL remarked, in regard to India, that, owing to the mode of levying taxes there, it was frequently the case that the Europeans paid scarcely any duty at all. When the matter was under discussion in the Houses of Parliament, Lord Stanley spoke to him on the subject, and he (Mr. Broomhill) told him that all the taxes he paid in India did not exceed fourteen shillings a year.

A discussion ensued as to the mode of procedure to be observed at the next meeting of the Committee.

TWENTY-FOURTH ORDINARY MEETING.

WEDNESDAY, MAY 27, 1863.

The Twenty-Fourth Ordinary Meeting of the One Hundred and Ninth Session was held on

Wednesday, the 27th inst., Thomas Winkworth, Esq., Member of Council, in the chair.

The following candidates were balloted for and duly elected members of the Society:—

Drake, Henry	24, Duke-street, Westminster, S.W.
Eales, Christopher	9, Welbeck-street, Cavendish-square, W.
Edney, William	38, Finchley-road, St. John's-wood, N.W.
Elliot, Russel	101, Long-acre, W.C.
Elt, Charles Henry	1, Noel-street, Islington, N.
Hammick, James Thos.	Census Office, Craig's-court, S.W., and 6, Winchester-road, Hampstead, N.W.
Roper-Curzon, Hon. H.	47, Argyll-road, Kensington, W.
Smith, W. H.	150, Leadenhall-street, E.C.
Taylor, John	Egremont-villa, Lower Norwood, S.

The Paper read was—

DESTRUCTIVE DISTILLATION, CONSIDERED IN REFERENCE TO MODERN INDUSTRIAL ARTS.

By B. H. Paul, Ph.D.

The effects produced by the application of heat to various substances must have been among the earliest observed chemical phenomena. The differences existing between the effects produced by heat upon different substances, were recognised at a very remote period in the history of chemistry, and among them the phenomena of distillation received especial attention. In some cases the application of heat to a substance has the effect of dissipating it entirely; such substances, of which water is a familiar example, are said to be volatile, and if substances of this kind are heated in closed vessels of suitable construction they may be recovered again, in their original condition, by the condensation of their vapour. This, in the strictest sense of the term, constitutes distillation. The volatile substance, absorbing the heat applied to it, becomes converted into vapour;—by abstracting from that vapour the heat which has been absorbed, it is converted into the original substance. In this way distillation is employed as a means of separating volatile substances from others which are not volatile, and which are, in contradistinction, termed fixed substances. This distinction between fixed and volatile substances is, however, in most cases merely relative, and it applies only to such a range of temperature as is commonly attainable. There are good reasons for the opinion that the substances commonly regarded as fixed, might be converted into vapour if their temperature could be increased to a sufficient degree. But among the substances which, in this limited sense, are termed fixed, there are some which certainly cannot be converted into vapour, in any case, without entirely losing their identity; without, in other words, being converted into totally different substances. Thus, for instance, wood is not a volatile substance, and at the same time it is not a fixed substance, except within a certain limited range of temperature. When heated much above the boiling point of water, wood is partially converted into vapour, to an extent proportionate to the temperature employed, but the vapour so produced cannot be reconverted into wood by cooling it, as the vapour of water can be reconverted into water. The change produced by the heating is a true chemical change. Most substances analogous to wood undergo a change of this nature when heated in close vessels; they are, in chemical language, decomposed, and the substances into which they are converted are called the products of the decomposition. These products are partly volatile. It is only in this way that substances which are not in themselves volatile can be said to distil, and it is this conversion of substances, by the application of heat, into new substances, that constitutes what is termed destructive distillation.

The products of this alteration present, in all cases, a general similarity. There is, in the first place, the carbonaceous residue, which cannot be volatilized—the "coal," as it was formerly called. Amongst the volatile products, water and oil are conspicuous; there are generally some substances dissolved in the water, communicating to it peculiar characters, according to the nature of the material distilled, and in all instances some gas is produced.

In the earlier days of chemistry the destructive distillation of organic substances was considered to effect a separation of their component parts; it was looked upon as a means of analysing both vegetable and animal substances. But it was found that the products of the destructive distillation of a substance varied in amount according to the heat applied to it, and, consequently, when quantitative relations became an important consideration in chemistry, this opinion was abandoned, and it has long since been generally admitted that the alteration such substances undergo in destructive distillation is greater than a mere separation of pre-existing components,—that it consists in an entire destruction of the original substance, with simultaneous production of new substances.

This decomposition of an organic substance by heat consists in a disturbance of the chemical equilibrium upon which its existence depends; the products to which it gives rise are substances capable of existing at the higher temperature. All organic substances are characterised by their liability to decomposition by heat, but they differ among each other very much in their capability of supporting heat, or, in other words, in their liability to decomposition under its influence. For every organic substance there is a particular range of temperature within which its existence is possible and beyond the higher limit of which it undergoes decomposition. Hence there is an intimate and essential connection between the nature of the products and the temperature of the decomposition, and it follows that the special nature of the products obtainable in destructive distillation differs, according to the temperature at which it is conducted, no less than according to the material from which they are obtained. These features of the decomposition of organic substances by heat, were very clearly recognised by Lavoisier; they received at his hands considerable attention, and though they did not occupy a prominent place in the chemical phenomena that, in his time, were the object of general interest, his works contain important discussions as to the causes to which they were referable.

Prior to the time when Lavoisier wrote on this subject, the product of destructive distillation to which—with some few exceptions which I shall afterwards notice—most attention was directed, was the oily product. The characters of the oil obtained by this means from different substances are often described in old chemical works. Sometimes it was called tar, that term being applied to those kinds of pyro-oils which were resinous and dried up by exposure to air, as in the case of that obtained from pine-wood, and which at the present time is still commonly known as tar. Some of these pyro-oils figure as medicinal agents in the pharmacopœia of 1678, and amongst others the oil of coal—which is described as a fossil bitumen, bearing the names of carbo petræ, lithanthrax, sea coal, or Newcastle coal—and the direction given is that "you may distil it as amber, so shall you have a spirit and oil." But this oil of coals soon became a matter of more extended observation, in consequence of the attempts made to use pit coal as fuel in smelting. For a long time these attempts were unsuccessful. At length, however, a method was found of removing the disadvantages of coal for smelting purposes. That method, as every one knows, was coking. The discovery of this method has been ascribed to Becher, who was in England

about the year 1665, but he says himself that it was a German, of the name of Blavesten, who first suggested the idea of employing what he called "stone charcoal" for smelting iron. In any case the oily product obtained from the coal, by heating it in close vessels, attracted the attention of Becher, and he put forward a project for making tar from coal, apparently in conjunction with the production of coke, which is very often referred to in old works, but always in very vague terms, and nothing much seems to have come of it.

The German chemist Neumann examined the oily products of the distillation of coal, and described them in his works as consisting of a "thin fluid oil" and another "thick pitchy oil." He obtained these by distilling the coal of Halle "with a fire gradually increased," and he states that "the coal, during the distillation, looked like melted pitch." Still these products were not turned to any useful purpose.

However, the coking of coal, or the desulphurizing, as it was sometimes called, became an important operation, and great interest was excited by it on the Continent. In 1765, the French Government thought it desirable to send a commission to this country, for the purpose of learning the art of coking. An account of their observations is given by M. Jars, the brother of one of the commissioners. He says:—"The English were the first to attempt rendering coal available for smelting purposes; the first trials are of a very remote date. And, among others, Swedenborg speaks of it as an art which in his time was not fully developed. But the industry of the English overcame all difficulties, and they succeeded, by means of very simple operations, in attaining the desired end, that is to say, in depriving pit-coal of the defects which render it unfit for smelting." The attempt to turn to account the volatile oily products obtained in coking coal was still continued, both in this country and on the Continent. At Liege, for instance, coal was distilled for oil, and similar attempts were made likewise in various parts of England, by the Marquis of Rockingham, near Sheffield, by a Dutchman named Van Haak, at Coalbrookdale and Newcastle, and by others.

One of the best known instances of the application of these volatile properties of coal, was one carried out in Nassau, shortly before the year 1768, at some iron works belonging to the Prince of Nassau-Saarbruck, at Sultzbach. This plan was described by M. Genssane to the French Académie des Sciences, and reported upon by Macquer. He says:—"The whole art of the preparation of pit-coal, so as to render it fit for smelting, consists in depriving it of the bituminous and sulphury substances which render it too fat and energetic when it is used in its natural state. * * * This principle once established, it is easy to conceive that it is only by distillation and evaporation that these two substances can be separated from the coal."

The distillation of coal at these works was conducted in a kind of close oven, or muffle, heated externally by furnaces. "The fire was got up gradually, until the oven became slightly red-hot, and it was then kept at that degree. * * * The heat being gradually communicated to the coal within the oven, first of all expelled its bituminous portion, which distilled off through a pipe, and fell into a receiver; when the coal had given off its bitumen, it commenced to become slightly red-hot.

"The oil and bitumen obtained in this operation almost paid the cost of it. * * The pure bitumen was very thick and greasy, and equal to the best carriage grease. * * The oil did not differ from that obtained by distilling petroleum, except in being much less readily inflammable than the latter, and it could be advantageously employed in lamps by the country people. Nothing else was used for burning in the mines at Sultzbach."

MM. Macquer and Montigny, in reporting to the Académie on this manufacture, speak highly of its utility, and when we consider the extent to which the manufacture of which this was the first germ, has now grown, it appears that their opinion was well founded.

The next person who made a step in this branch of manufacture was Lord Dundonald. The preparation of coke appears to have been still the predominating idea, but it was also thought that the volatile substances given off in this operation might be turned to account, as well as the coke. All the previous methods of obtaining these products consisted in distilling coal in close vessels heated externally, but Lord Dundonald's method consisted in partially burning the coal in a large chamber capable of being entirely closed, and admitting a regulated supply of air, just sufficient for maintaining the combustion of coal at the desired degree. The volatile products from the coal passed away through a pipe to a condenser, where they were collected. An account of the works erected on this plan, at Upper Cranston, is given in Sir John Sinclair's "Statistical Account of Scotland." The product obtained, besides coke, was a mixture of tar and water. This first product was submitted to distillation, yielding an oil lighter than water, and a solution of ammonia. This tar was sold for greasing cart wheels, at the rate of sixpence per Scotch pint. When the distillation was continued for 4½ days, the residue, remaining in the still, was the tar suitable for coating ships, which was regarded as one of the most important of the products. When the distillation was continued for 5½ days, the residue in the still was more pitchy; and after 6½ days it was quite brittle.

Just at the time when Lord Dundonald was carrying out his enterprise of coal distilling, the subject of destructive distillation was treated of by Bishop Watson, in one of his essays. He gives the results obtained by the distillation of pit coal, "with a fire gradually augmented," and describes one portion of the oil he thus obtained from Newcastle coal, as being lighter than water, "more or less liquid and transparent, according as the heat used in conducting the distillation has been greater or less."

Another portion of the oil was black, thick, and tenacious, much resembling tar. He also states that, "The quality of the liquid separable from wood by distillation is wholly the same as that of the liquid separable from pit coal by the same means."

He also adds that "it is probable that the quantity of oil separable from the same kind of coal by distillation may be influenced in some degree by the manner of performing the operation; and there is, moreover, some reason to believe that in different kinds of coal the quantities may be very various."

This conjecture was soon supported by results of observation. M. Sage, in a paper on coal, published in 1789, describes English cannel coal as yielding "by distillation more than one-third of its weight of oil that solidified in cooling," while the French coal gave only one-sixteenth of its weight of oil. Newcastle coal, though containing "as much bitumen as cannel coal," was described by the same observer as being very different from it, and Scotch coal, which contained much less bitumen than either of the preceding coals, gave by distillation an oil that was liquid and floated on water.

Kirwan, in 1796, stated that almost all species of mineral coal yield on distillation more or less of both species of bitumen—solid and liquid—but that "the proportion is variable in every species, according to the degree of heat applied." Referring to Lord Dundonald's method of obtaining tar from coal, he says—"By his lordship's mode of distillation, however, much seems to be lost during the internal combustion. I should think the Prince of Nassau-Saarbruck's method in this respect more advantageous. M. Sage tells us that by distillation he obtained from cannel coal one-third part of its weight of tar."

It is very interesting to find that Kirwan describes the coal used by Lord Dundonald for distillation as being a kind of cannel coal, similar to, but of a better sort than, the "stony or slaty cannel coal" from Ayrshire. This coal is described as burning like compact cannel coal, without caking, and leaving a stony residuum. It contained 20·83 per cent. of ash.

Proust also, in 1806, described the oils obtainable from coal by distillation: a light oil similar to that of amber, and a heavy oil like tar. He says that "the oily products of coal vary much in consistence, and it is necessary always to make an experiment to ascertain if it will yield thick oil or tar."

Lord Dundonald's method of distilling was carried out also in France by a M. Faujas de Sainte Fonds, who claimed to have conceived the same idea of obtaining the volatile products given off in coking, before knowing of Lord Dundonald's plan, although he was confirmed in that idea by visiting the tar works in Scotland. Shortly after his return to France an experiment was made by him, by the order of M. de Calonne, to illustrate the operation, and an account of it is given in a scientific journal of that time.

Just at this time, however, a circumstance took place which exercised a great influence on the development of this young branch of manufacture. The oil manufactured by Lord Dundonald was just beginning to be employed for street lamps, and it is said that he was in treaty with the authorities with a view to the lighting of London by means of it, when a new project was started, viz., the use of gas as a source of light, which eventually proved the overthrow of Lord Dundonald's undertaking.

The chemistry of gases, or pneumatic chemistry, as it was then termed, had, during the latter half of the 18th century, gradually absorbed the attention of chemists. As far back as 1721, Hales had, in the course of his experiments on air and its relation to vegetation, observed that Newcastle coal yielded in distillation one-third of its weight of air. In 1739 Mr. Clayton was induced, by the observation of a natural discharge of combustible gas from the neighbourhood of a coal pit, to try the effect of heat upon coal, and he found that by distillation he obtained a similar inflammable gas, together with a black oil and some watery liquid. This spirit of coals, as he called it, served him for the amusement of his friends, and for the entertainment of the Royal Society, but for no further purpose. In 1759, Neumann stated in his "Chemistry" that vegetable substances in general, urged hastily by a strong fire, emit an aerial elastic vapour. Bishop Watson also refers to the inflammable gas produced in distilling coal, etc. He says, "the products obtainable by distillation from bituminous and vegetable substances in general are water, gas, oils of different colours, weights, consistencies, and a black, coaly residuum." It was not, however, until shortly after the year 1790 that a Cornish engineer, Mr. Murdoch, not only observed that the gas given out by heating coal, wood, peat, &c, burnt with a bright luminous flame, but also conceived the idea of using the gas thus produced as a source of light. A somewhat similar idea was about the same time being carried out in France by Le Bon, the material from which gas was obtained being wood.

The announcement of this invention produced a most remarkable effect. Notwithstanding energetic opposition to its introduction, it rapidly gained ground; in 1810, the first Gas Light and Coke Company was formed, and ten years later gas was almost universally used in London.

Attention was thus suddenly diverted to the gaseous products of destructive distillation, as a source of light; but the oily products were not wholly forgotten, nor did the nature of the relations existing between them and the gaseous products admit of their being overlooked. Long before any great attention had been directed to the gaseous products of destructive distillation, it had been observed that both the quantity and the quality of the oily products obtained from any given material depended upon the degree of heat employed in the distillation. But when the gas produced in the distillation also became an object of investigation, and when the means of producing it for practical purposes were being developed, it soon became evident that, to a great extent, gas and tar or oil were convertible substances; that whenever a great deal of oil was produced only a small quantity of gas was obtained. This fact threw a new light upon the nature of destructive distillation, and since it was a most important desideratum, in regard to this new manufacture, to obtain the largest possible quantity of gas, the conditions requisite for effecting this object were specially investigated at a very early period in the history of gas lighting.

The general result arrived at was, that the production of the largest amount of illuminating gas from coal required the distillation of the coal to be conducted within a certain range of temperature. When the temperature was much below an ordinary red heat, a smaller quantity of gas was obtained than when the distillation was conducted at a full cherry-red heat, and at the same time a larger quantity of the oily product was obtained. On the other hand, when the temperature was much above a full cherry-red heat, the quantity of gas was much increased, but its illuminating quality was very much reduced. Hence a cherry-red heat was fixed upon as the temperature to be employed in practice, because that was the temperature at which the largest quantity of the volatile products were converted into the state of gas of the greatest illuminating power, and at which the smallest quantity of those products remained in the liquid state.

Accordingly, in practical and scientific works, treating of the manufacture of gas and the phenomena of destructive distillation generally, this fact is prominently mentioned. Thus, for instance, Accum says: "The production of carburetted hydrogen, both with regard to quantity and quality, from the same kind of coal, depends much upon the degree of temperature employed in the distillatory process. If the tar and oil produced during the evolution of the gas in its nascent state be made to come in contact with the sides of the red-hot retort, or, if it be made to pass through an iron cylinder or other vessel heated red-hot, a large portion becomes decomposed into carburetted hydrogen gas and olefiant gas, and thus a much larger quantity of gas is produced than would be obtained without such precaution, from the same quantity of coal." This was rendered still more evident by pointing out that every pound of coal tar so decomposed produced "15 cubic feet of carburetted hydrogen, abounding in olefiant gas."

Ure, in 1824, describing the theory and practice of the production and use of coal gas, says, "If coal be put into a cold retort and slowly exposed to heat, its bitumen is merely volatilized in the state of condensible tar; little gas, and that of inferior illuminating power, is produced. This distillatory temperature may be estimated at about 600 degs. or 700 degs. Fahr.

"If the retort be previously brought to a bright cherry red heat, then the coals, the instant after their introduction, yield a copious supply of good gas, and a moderate quantity of tarry and ammoniacal vapour."

Dumas, in 1828, describing the general features of destructive distillation, says that the nature of the products depends on the temperature employed. "By heating gradually, oil is produced, and at a higher temperature no oil is obtained, because it cannot exist at the higher temperature." Describing the manufacture of gas, he adds that the products obtainable from coal by distillation are "coke, tar or oil, and gas." The relative quantities of each of these products are very different, not only according to the different kinds of coal, but still more according to the temperature at which the decomposition is effected. Experience has shown that the quantity of oil or tar, as well as that of coke is greater when the temperature is low; while these products are formed in less proportion when the temperature is high. The quantity of gas, on the contrary, is greater at a high temperature than at a low temperature, that is to say, the more gas is obtained, the less tar is produced. It is evident, therefore, that during the operation of gas making a suitable temperature must be maintained. If it is too low, a large quantity of tar is produced and little gas."

Hence it is evident, as I have before remarked, that

though attention was directed chiefly to the production of gas, the other product of destructive distillation, viz., the oil, was not forgotten, although it was not the desired object of the manufacture. And though gas had become the chief object of attention as a source of light, the production of oil, by destructive distillation, was not abandoned. So late as 1819, Waterloo-bridge was lighted with coal oil, and in the same year M. de Saussure published an account of a method of purifying hydrocarbon oil, obtained by the destructive distillation of a bituminous mineral found at Travers, in Neufchatel. That method is identical with those employed at the present time. But it was in 1833 that the first important impulse was given to this manufacture, by the investigations of Reichenbach into the chemical nature of the products obtained by the destructive distillation of organic substances. Up to that time the knowledge of the oily products of destructive distillation, in regard to their chemical nature and the means by which they might be purified, was very slender. It was known that different materials yielded different kinds of oily products, and that the quantity obtainable varied according to the nature of the material and the temperature of the distillation. Neumann described the oil first drawn in the distillation of organic substances by a fire slowly raised, as being commonly fluid and lighter than water, while that which followed, at a higher heat, was thick and heavy, and that forced out at last, by the "greatest vehemence of fire, assumed a pitchy substance." Accum described the tar from Newcastle coal as being specifically heavier than that produced by cannel coal; hence it sank in water, whereas the latter swam on the surface of water.

The tar obtained in gas-works required to be boiled down to give it a sufficient consistence, and render it fit for use in coating wood. When this process was conducted in close vessels, a portion of oil was obtained that was commonly known as oil of tar, and by carrying on the distillation still further, more oil was obtained and a residue of pitch. The crude tar gave about 25 per cent. of the first-named oil, and by further distillation about 47 per cent. of pitch. No great use was made of these oils however, and, as is still the practice, gas tar was often boiled down in an open vessel without attempting to collect the oil.

While things stood thus, Reichenbach's first paper appeared. He referred to the oily products of destructive distillation as substances that had hitherto received but little attention from chemists, partly in consequence of their having been rare, and partly because those that were known, possessed characters that prevented their being applied to practical purposes; thus, for instance, their use as illuminating materials was prevented by their copious production of smoke when burnt; by their too great inflammability or liability to alteration when exposed to the air, their offensive smell, and several similar obstacles. He therefore considered that a more complete investigation of these products was desirable, and the thorough practical spirit in which he undertook this investigation is apparent throughout his memoirs.

The first substance which he succeeded in obtaining from tar was paraffin. That substance is now too well-known to need a repetition of his description of it. I need only mention that he described it as existing in tar in considerable quantities. He pointed out that the application of tar as a material for greasing the axles of cart-wheels depended upon the presence of this substance in tar, and that it was likely to furnish an appropriate material for making candles. He showed, also, that its peculiar chemical stability, under the influence of powerful re-agents, was such as to suggest various easy means of extracting it from tar on a manufacturing scale. He then adds:—"I have here spoken only of the tar of beech-wood; however, it is not only in this, but also in the tar of pine-wood, that I have ascertained the existence of paraffin, and there is no doubt that it is produced by the distillation of all kinds of wood." Shortly afterwards he obtained paraffin by distilling animal substances. This led him to the conclusion that paraffin is a product of the carbonisation of all organic substances, and he then extended his investigation to mineral substances, principally coal. By distilling coal in an iron retort, "commencing the distillation at first with a gentle heat, then gradually raising it, till at last the bottom of the retort was made dull red-hot, and then cherry red," he obtained an oil containing paraffin, and then pronounced paraffin to be a common product of all substances of organic origin.

The next substance which he succeeded in obtaining from tar was a liquid oil, to which he gave the name of eupion. This oil he also found to be a product of the carbonisation of coal and all organic substances. While paraffin was obtained in least amount from the tar of coal, the liquid oil was obtained in larger amount from this tar than from any other. The oil to which he gave the name of eupion does not appear to have been a distinct chemical substance, but it was perfectly analogous, if not identical, with the hydro-carbon oils now used for burning in lamps, except that it was very much more highly refined than those oils are in practice.

Referring to the possible application of this oil, Reichenbach says, "If it should hereafter be possible to separate eupion from tar sufficiently cheaply, it is probable that it may be applied to useful purposes; for, since it burns brilliantly, without smoke, by means of a wick, it is suitable as an illuminating material, not inferior to the finest oil; it does not grease, nor char the wick, nor thicken by keeping, nor solidify in the cold. Besides this it is not requisite for any applications in which the oil is not exposed to cold, that the paraffin should be separated from it."

At the conclusion of his first memoir, Reichenbach expressed the hope that the oily substances obtainable by destructive distillation might, from a scientific point of view, receive more attention than they had hitherto, especially since one of them, paraffin, had been ascertained to exist in such abundant quantity in tar, to be capable of being introduced into industrial economy, and to possess characters that would render its extraction easy.

Just at the very time that Reichenbach discovered paraffine, and ascertained that it was a general product of destructive distillation, the same substance was obtained from the native petroleum of Rangoon by Dr. Christison, of Edinburgh. He gave it the name of petroline in the first instance, but subsequently recognised it to be the same substance as Reichenbach had produced by destructive distillation of organic substances and coal. Dr. Christison also obtained four different kinds of oil from Rangoon petroleum, different in colour, boiling point, &c.

The most important part of Reichenbach's memoirs consists in the very thorough elucidation they give of the phenomena of destructive distillation, as regards the oily products of that operation. It was to these oily products that his attention was exclusively directed, and in the incidental notice he had occasion to take of gas making, he showed very clearly that the conditions which give rise to the production of gas are very different from, and indeed the opposite of, those which determine the formation of oily products.

In describing the general character of tar, or the oily product of destructive distillation, he says:—"Tar is not a uniform or definite material, but a mixture of various constituents, which differs according to circumstances. All carbonisable substances yield tar, but the tar is of different kinds, according to the nature of the material it is produced from.

"Moreover, tar varies in its character, according as it is produced under absolute or partial exclusion of air, according as it is produced in one or other kind of vessel; * * * it is one thing when it is produced slowly, and another when it is produced rapidly; it is different at the beginning and the end of the carbonisation. When the carbonising heat is high, the tar produced is different from that produced when the carbonisation is conducted

within the limits of a moderate temperature." He showed that, as a general rule, the production of tar, consisting of oil and paraffin, depends upon the application of a moderate heat, only just sufficient to carbonise the substance operated upon. In treating of the distillation of coal, he especially pointed out that this was the condition most essential for obtaining tar containing oil and paraffin, that by conducting the distillation of coal so as never to allow the retort to become red-hot, he always obtained tar containing eupion, paraffin, and creosote. This was what he termed a "pure tar of carbonisation," and to obtain such tar he particularly stated that it should not, at any stage of its formation, be exposed to a higher heat than that sufficient for carbonisation. The tar produced at a high temperature, on the contrary, he showed to be entirely different in its nature, whether obtained from coal or any other material. In the first place, it did not yield by re-distillation, more than half as much oil as pure tar, and it contained substances which were never present in pure tar obtained at a low temperature. These substances were naphthalin, pitch, and soot, and the tar obtained from coal in the manufacture of gas was found to be of this kind; it was not a pure tar of carbonisation, but an impure mixture. The circumstances which gave rise to this great difference between the tar obtained at different temperatures were ascertained and very clearly described. It was shown that naphthalin was not a product of carbonization; that while mere carbonization yielded only oily products, naphthalin was produced by the further decomposition of those products under the influence of a higher temperature—that it was a secondary product—and it was shown that the operation of gas-making did not admit of simple carbonization, since a bright red heat was necessary for producing gas. For this reason the tar of gas-works was black and thick and contained naphthalin, because the oil vapours, produced from the coal in the first instance, came in contact with the sides of the red-hot retort and were thereby decomposed.

Considerable prominence was given to this important difference between the tar produced from coal, at high and low temperatures, in consequence of an opinion expressed by Dumas that naphthalin was a direct product of the distillation of coal, and of the conjecture founded on that opinion that naphthalin existed in coal. This led to the repetition of Reichenbach's experiments, and to the publication of a memoir in which he satisfactorily showed that coal did not contain naphthalin, and that coal tar did not contain it unless it had been submitted to a high temperature and partially decomposed. Reichenbach showed, moreover, that naphthalin was obtainable in like manner from the tar of wood, from alcohol, ether, naphtha, and probably even from olefiant gas by exposing these substances to a bright red heat. The accuracy of these observations was recognised by Dumas, who quoted them in his treatise. The general results of these investigations were, that the production of oily substances by destructive distillation was essentially dependent upon the application of a moderate degree of heat; that the constant products of this operation were eupion and paraffin, together with some others that have not yet been turned to account.

Attempts were soon made to apply the knowledge thus obtained for practical purposes. Materials were sought for that would yield oil and paraffin in sufficient quantity to admit of their being worked. The ordinary coal, then in general use, yielded too little of these products, and the first material to which attention was directed was bituminous schist or shale. A variety of this mineral occurring at Vouvant, between Nantes and Rochelle, was examined by Dumas, and found to yield 14 per cent. of oil, and works were established about the year 1830 for the purpose of manufacturing oil from it by M. Selligue. The crude oil obtained from it is described by Dumas as being greenish-brown and solidifying when cooled in consequence of containing 2 or 3 per cent. of paraffin. He also pointed out the applications to which these products might be turned as a source of light both by burning in lamps and making gas.

Very shortly after this M. Laurent, who had visited the neighbourhood of Autun and suggested the manufacture of these oils, published an account of an English schist that had been sent him for examination and which he found to yield 20 per cent. of oil by distillation at a low temperature, finally raised to a red heat. In 1833, a patent was taken out in this country by Richard Butler for the manufacture of oil and gas, from bituminous shale, which consisted in an application of the results obtained by Reichenbach, and of the principles he had laid down with regard to destructive distillation. The specification of this patent is interesting from its containing the earliest mention of paraffin, as the product of a manufacturing operation. It is stated that the less volatile portion of the oil, obtained by distillation below a red heat, contained a white colourless substance—a compound of carbon and hydrogen, which separated in small flakes when the oil was cooled. The claim in this specification is for "the production of oils, by distillation or carbonization, from bituminous schistus or shale, and slate. not including slate coal and bituminous sandstone;" and for "the production of gas for illuminating purposes from such oils, or direct from the bituminous schistus or shale, and slate, &c." For the direct production of gas it is directed that "the retorts should immediately be brought to a red heat," while on the contrary, the heat was to be gradually applied when the object was to obtain oil in the place of gas. It is interesting here to notice, that the main principle of distillation at a low temperature for the purpose of obtaining oils, was fully recognised and applied in the method proposed by Butler, as well as in all subsequent proposals in reference to this manufacture, still the influence of Dumas' authority was recognizably exercised, in this instance, in regard to the exclusion of coal. This, the patentee states, was not to be used because it yielded tar containing naphthalin. That influence is recognizable even at a later period, notwithstanding the fact that in 1835, Dumas had quoted Reichenbach's results as being contradictory of the opinion he had formerly expressed, that naphthalin either existed in coal, or was a product of its distillation. It is worth remark, also, that it is uncertain to whom this opinion is due, for M. Dumas, in 1832, ascribes it to Laurent, while Laurent writing at the same time ascribes it to Dumas, and Oppermann, also at the same time, says that Reichenbach has decisively proved that naphthalin is produced only by the destruction of the oils by a high degree of heat.

Another patent for a method of effecting the same object was taken out in 1831 by Mollerat.

In 1841, a patent was taken out by Hompesh for "improvements in obtaining oils and other products from bituminous matters, and in purifying and rectifying oils obtained from such matters. The objects of these improvements were to obtain a larger quantity of oil, and to improve its quality by removing or greatly modifying the disagreeable smell. The former object was sought to be obtained by a special arrangement devised for very gradually increasing the heat in the distillation of the shale and consequently preventing the decomposition of the oil vapour produced. The means of attaining the second object consisted merely in an amplification of the method already made known by de Saussure for the purification of hydrocarbon oils.

Another patent was obtained in 1845 by Du Buisson, for "New and improved methods for the distillation of bituminous schist and other bituminous substances, as well as for the purification, rectification, and preparation necessary for the employment of the productions obtained by such distillation for various useful purposes." In his specification he says, that though many attempts had been made in England to render bituminous shale useful, they had all failed, while the most important results had been obtained at the works near Autun. His method of treatment consisted in a further application of the principle

of distillation at a low temperature, so as to obtain the largest yield of oily products, and to prevent their decomposition into gas by the influence of too high a temperature on this vapour. He proposed to effect this by introducing into the retorts, steam heated by passing it through red-hot pipes, so as to sweep out the oil vapours, and at the same time to admit of the distillation being completed at the lowest possible temperature. The retorts were to be heated externally as before, but the steam introduced was not under pressure, so that while equalizing the temperature of the shale under distillation, and acting mechanically in removing the oil vapours it also kept the temperature from rising so high as to convert them into gas.

About the year 1845, works were erected at Beul, on the Rhine, for the manufacture of oils and paraffin from a mineral that occurs there. It is an imperfect coal, generally known by the name of "brown coal." These works have been in operation since that time to the present.

In speaking of the practical applications of the products of destructive distillation, I must not omit to mention the patent obtained by Mr. Mansfield, in 1847, for "An improvement in the manufacture and purification of spirituous substances and oils, applicable to the purposes of artificial light, and various useful arts, and in the application thereof to such purposes, and in the construction of lamps and burners applicable to the combustion of such substances." This is described in the specification to consist—

1st. In methods of separating the oils and spirituous substances contained in tar, or oils distilled from any kind of coal, either in the manufacture of gas, or by any other process of destructive distillation of coal.

2nd. In methods of purifying volatile bituminous oils found native, or produced by destructive distillation.

3rd. An improved application of the products, thus obtained and purified, to the purposes of artificial illumination, by reducing the proportion of carbon in the flame produced by burning them.

The method adopted by Mr. Mansfield for separating the constituents of tar, was to collect, in fractional portions, the oil distilled off at different temperatures. The purification of the products thus obtained was to be effected much in the same manner as that described by De Saussure, by Reichenbach, and in the specifications already mentioned. The reduction of the proportion of carbon in the flame of the oils from tar, was effected either by mixing them with other combustible liquids containing a smaller amount of carbon and more oxygen, or by mixing them with a gas containing less carbon, or none at all, such as carbonic oxide, or atmospheric air. For this latter purpose the most volatile portions of the oils obtained from tar were employed.

Further attempts were made in this country to work the bituminous shale of Kimmeridge and Wareham, and also to manufacture oil from peat, under a patent obtained by M. Reece in 1848, but no results of any advantageous nature were obtained in either case.

The cause of these failures to establish in this country the manufacture of the products which had been found profitable on the Continent, was twofold. In the first place, the general introduction of gas lighting limited the possible demand there might otherwise have been for an improved illuminating material; and, in the second place, the materials operated upon yielded the oil in such small proportion, and, frequently, of such an offensive character, that it was found impossible to introduce it into use for lamps, or to manufacture it profitably for other purposes.

But, on the Continent, the oil-yielding materials worked there, though not much more productive than those in this country, furnished oil of a less objectionable character, and more easily purified. Moreover, as gas was little used, there was a wider field for the introduction of this oil as an illuminating material. It rapidly came into use, and several manufactories were established for its production in various parts of Germany. It was there that the manufacture was perfected, and that the demand for these products of distillation was first established.

The next step in order of time was in the year 1850, when a patent was obtained by Mr. W. B. Stones for "Improvements in treating peat and other carbonaceous and ligneous matters so as to obtain products therefrom." These improvements are described in the specification to consist in distilling "shale, stone-coal, cannel coal, and other coals, petroleum, asphaltum, &c.," so as to extract from them oil and paraffine, and in methods of separating and purifying these substances. The distillation was to be effected in closed vessels, not heated externally, but by means of steam heated to a sufficient temperature to carry off the products in a state of vapour. Shortly afterwards, in the same year, a patent was obtained by Mr. James Young, for "Improvements in the treatment of certain bituminous mineral substances, and in obtaining paraffin therefrom." These improvements are described in the specification to consist in gradually heating the coal up to a low red heat, at which it is to be kept until volatile products cease to come off, care being taken to keep the temperature from rising above that of a low red heat, to prevent as much as possible the desired products of the process being converted into permanent gas. The product so obtained was described as oil containing paraffin, and was hence called paraffin oil. Methods of separating this product into various useful commodities, and of purifying them, were also described in the specification.

In the Exhibition of 1851, specimens of paraffin and other products obtained by the distillation of peat, shale, coal, and bitumen, were exhibited, and in the Jury Report it is stated that "the condensible products from the distillation of coal and other bituminous products are becoming every day more important," the value of these products for lubricating purposes being especially pointed out.

At that time the only hydrocarbon oil used in this country as an illuminating material was camphine—a very highly refined spirit of turpentine. Though the hydrocarbon oils obtained by destructive distillation were largely used on the Continent for burning in lamps, they had not come into use for that purpose here, and were not so used until several years afterwards. But success had been attained in the application of hydrocarbon oils from another source and in a different direction. The intimate connection and similarity between the oily products of destructive distillation, and mineral oils, such as petroleum, found in many places, had long been recognized in a general way, and was described in most chemical works.

Dr. Christison had shown that this resemblance extended beyond the mere outward character of these materials by the extraction of paraffin and various oils from the petroleum of Rangoon, and various other chemists had added to the knowledge of these native oils. In 1847, about the time Mansfield's patent was taken out, petroleum was discovered in a coal mine in Derbyshire, and Dr. Lyon Playfair drew the attention of Mr. James Young to it, the consequence of which was that he took a lease of the petroleum spring in conjunction with Mr. Meldum, and established a manufacture of lubricating oil from this material. This was the first successful application in this country of hydrocarbon oils, and the first instance of the realization, in this country, of Reichenbach's prediction that these materials would become useful as soon as they could be obtained in adequate quantities and at a sufficiently low cost.

I have already referred to the small quantity of oil yielded by the bituminous shales, as having been one of the main causes of failure in the attempt to establish the manufacture of hydro-carbon oils, and, as the respective capabilities of various materials in this particular, is still one of the most important circumstances connected with their application, it is desirable to refer to this point more fully.

The different varieties of bituminous minerals, including bitumens, shale, and coal of all kinds, vary very con-

siderably in the amount of volatilisable substance they yield when heated in a close vessel. This character is one in which these minerals present greater differences than in any other. Even in the case of coal the differences are considerable. The results obtained in gas making may be taken as an indication of this fact.

		Newcastle.		Derbyshire deep main.		Wigan.		Ramsays.		Wemyss.		Lesmahago.		Boghead.	
Coke			1,494		1,335		1,326		1,435		1,156		1,077		710
Volatile	Gas	291		300		338		410		539		473		749	
	Tar	135		219		250		295		210		600		780	
	Water & loss.	320		386		326		100		435		90		1	
			746		905		914		805		1,184		1,163		1,530
			2,240		2,240		2,240		2,240		2,240		2,240		2,240

It is evident from this table that the bituminous portions of different coals differ very much in regard to the amount of volatilisable substances they are capable of yielding by distillation. But this difference is greater than it appears to be from the above table, on account of the differences in the amount of ash contained in coal. Boghead contains 22 per cent., Newcastle only 3 per cent., and when this is deducted, the true relation between the volatilisable and fixed portion of the bituminous part of the coal becomes apparent.

	Newcastle.	Birtley.	Lancashire.	Derbyshire.	Wigan.	Lesmahago.	Albertite.	Shale.	Boghead.	Shale.
Fixed carbon......	69	63	60	59	55	42	33	20	12	5
Volatile............	31	37	40	41	45	58	67	80	88	95

Then comparing the amount of oil produced from coal by distillation at high and low temperatures, it appears that the differences in this respect are not by any means so important as the differences between the amounts of oil from different materials.

	Newcastle Coal.		Boghead Mineral	
	Bright red heat.	Low red heat.	Low red heat.	Bright red heat.
	lbs.	lbs.	lbs.	lbs.
Coke	1,494	1,544	...	710
Tar	135	274	936	780
Gas	291	252	...	749
Water & Loss ...	320	170	...	1

It is not only in regard to the quantity of oily product obtainable by destructive distillation that there are differences between bituminous minerals. The nature of the products so obtained is also very different. The oil obtained by distilling Newcastle coal is very different in its characters from that obtained by the similar treatment of the better kinds of cannel coal, bituminous shale, brown coal, &c.

It was, therefore, a very fortunate circumstance that, just at the period when the use of hydrocarbon oils for lubricating purposes was becoming established in this country, a new material was discovered at Boghead, near Edinburgh, which possessed, in a most remarkable, and then unparalleled degree, the capability of yielding, in great abundance, oil of such a nature as to be suitable for this manufacture. The discovery of this mineral just at this time was rendered more especially important from the circumstance that while the application of hydrocarbon oils was extending, the petroleum spring which was, in this country, the only source of these oils, was rapidly becoming exhausted. The ordinary kind of bituminous shale had been found unsuited for the purpose, and the manufacture was for some time likely to cease, when the discovery of this new mineral entirely altered the prospects of the manufacture. Works were established near the place where it was found, and the production of oil was soon carried out extensively. After a few years it was introduced, in this country, as an illuminating material, and since the year 1858 its use for that purpose has become very general.

About the year 1853, the manufacture of hydrocarbon oils and paraffin from Rangoon petroleum was commenced, and the burning oil obtained from it, and sold under the name of Belmontine, was the best oil of this kind yet manufactured. It was, however, high-priced, and the introduction of American petroleum appears to have caused it to disappear.

The superior excellence of the Boghead mineral, above all others, as an oil-yielding material, led to its being largely exported for the manufacture of oils, not only to the Continent but also to America, and for a time it was almost the only material used for the purpose. In America, however, other oil-yielding materials were soon afterwards discovered, which, if not equal to that of Boghead, were sufficiently productive to be worked there in its place, and not long after these materials had been in use the copious sources of native petroleum in various parts of America were discovered. This discovery has within the last two years produced a wonderful extension in the use of hydrocarbon oils, but, although, according to the latest accounts, the importation of petroleum into Liverpool during the last four months amounted to 2,000,000 gallons, more than twenty times as much as was imported during the same period in 1862, still the supply is not in excess of the demand, and the production of hydrocarbon oils by destructive distillation has not been stopped by the supply derived from this novel source.

The other products of destructive distillation are, for the most part, merely accessory products, and therefore do not require any special consideration. Among them are acetic acid, creosote, and wood naphtha, obtained in the manufacture of wood charcoal. Ammonia is produced in the manufacture of illuminating gas, in small amount, but in such considerable gross quantity, that this has long been the only source of ammonia and its salts, which are now so much more largely consumed than formerly, both as manures and in chemical manufactures. The oil known as "dead oil," and sometimes as "creosote," though different from the creosote of wood, is largely employed as a preservative of timber. The naphtha extracted from the coal-tar of gas works, in preparing this "dead oil," was formerly much used in the manufacture of waterproof cloth, but has now found a more profitable application in the production of the brilliant dyes that have lately been introduced under the names of mauve,

magenta, &c. The technical history of these dyes has lately been so ably described before the Society, that I can do no more than name these important materials, as being essentially products of destructive distillation, to illustrate the importance of this comparatively new art.

There is, however, one point with regard to the introduction of these dyes to which I cannot omit to refer. The immediate source from which these dyes are derived is a substance called aniline. This substance has been known to chemists for upwards of thirty years, and has been the subject of several elaborate investigations. It was first obtained from coal-tar. But though aniline was well known to chemists, and though another of its early sources was, singularly enough, indigo, no idea seems to have been entertained of its becoming of industrial value, or of its capability of yielding dye substances. It was indeed an extremely rare substance, and prior to 1854 was obtainable only in very small quantities. In the course of that year, however, M. Bechamp, a French chemist, ascertained that a substance derived from the light naphtha of coal-gas tar, was capable of being converted into aniline by a very easy operation. This circumstance, affording the means of obtaining aniline abundantly, together with the scientific interest that aniline had been shown by Dr. Hofmann to possess, appears to have led him, and other chemists, to make it the subject of their study. In the course of these investigations, it was observed, by Dr. Natanson in 1856, that a yellowish-red substance was obtainable from aniline by the action of elayl chloride. This substance does not appear to have been susceptible of application as a dye, nor the observation to have been regarded as having any practical significance. In the same year, however, Mr. Perkin, one of Dr. Hofmann's pupils, also studying the chemistry of aniline, happened to obtain from it a product possessing a rich violet or purple colour, which he soon found applicable in dyeing, and for the preparation of which he took out a patent shortly afterwards.

In 1858, Dr. Hofmann observed that by the action of a carbon chloride on aniline, a magnificent crimson-coloured substance was produced, but no reference was made to its technical applications. These two observations were the starting-points of the aniline dye manufacture, which has now acquired such gigantic proportions.

My object, in thus tracing the origin and history of this industry, is, by comparing it with the history and origin of the other industrial arts, connected with destructive distillation, to illustrate the progress that has taken place in the application of science to arts, and the advantages resulting from the increased facilities now existing for that application. Six years ago, it was first observed that a dye could be prepared from aniline. Six years ago aniline was a curiosity, unknown to any but those familiar with the more abstruse departments of chemistry. Now, in consequence of that observation, it is made by tons.

The case is very different with the hydro-carbon oils that are now so largely used as a source of light. To go no further back than the date of Reichenbach's elucidation of the nature of the substances produced by destructive distillation, of the conditions under which they were obtained, and of the uses to which they might be applied, it appears that the results which he obtained and placed at the disposal of all, slept unproductively and unused for near 20 years after that time; and for some three parts of a century since the same materials were used, in a crude condition, for lighting the mines of Sultzbach. It is true, the absence of a material that would furnish the oil and the paraffin in sufficient abundance, may have been one reason why the results of Reichenbach's researches were not sooner turned to useful account, in the way he suggested. But in the case of coal gas there was no such obstacle. Coal was everywhere used, and abundant. The fact that illuminating gas was obtainable in large quantity from coal by distillation, was known as far back as 1739, at least, but, for upwards of 50 years, no one conceived the idea of using that gas as a source of light. I believe the most important obstacles to the earlier application of these facts to have consisted, partly in the want of sufficient appreciation of scientific results by manufacturers generally, and partly, perhaps to a greater extent, in the tendency of chemists, according to the fashion of that time, to regard the results of research too exclusively in an abstract light, and as curiosities for the entertainment of a privileged few. This fashion is fortunately antiquated, if it be not extinct, and the rapidity with which the acquisitions of science now pass into the wider sphere of practical application, affords good ground for the conclusion that the more intimate relation existing between practice and science is both wholesome and beneficial.

DISCUSSION.

Mr. Wentworth L. Scott (responding to the invitation of the Chairman) said he believed, as regarded the destructive distillation of coal, Boyle was the first to hint at the existence of spirit in coal. In the statistical part of the paper, it was stated that during the last four months of the present year the importation of petroleum oil from America amounted to two million gallons. He believed those figures fell considerably short of the actual amount imported. According to the returns of Mr. Wormald, of Liverpool, the quantity imported during the whole year of 1861 was 1,492,473 gallons, and in 1862, 10,625,568 gallons. He, therefore, thought there was some error in the figures given in the paper, and he believed the quantity of petroleum oil imported during the last four months was double that stated. Mr. Paul had alluded to Charles Mansfield, who might be regarded as a martyr to the new science of destructive distillation, but it might be further remarked that he was the first person to propose what was now called the carburation of gas to increase its illuminating qualities. The proposed cylinders or vessels, through which the gas passed, were filled with small portions of pumice-stone or other porous material soaked with benzole; and the question had been raised whether some recent patents had not been invalidated by Mansfield. Looking at the comprehensive title of the paper he (Mr. Scott) confessed to a slight feeling of disappointment that it had not given some indication of what might probably be done in future, not only in the distillation of coal, but also of other organic substances. Waste products had been a favourite subject amongst many members of the Society, though they had been treated of as yet in an imperfect manner; both as to coal, and animal and vegetable products, of which imperfect use was now made, the whole question was yet in its infancy. Although the effects of different temperatures upon the same, and different descriptions of coal, had been stated in a general way, it was very important that the results of these various experiments should be carefully tabulated, and also that the effect of distilling coal mixed with other substances of a similar nature in different atmospheres should be investigated. He might mention, that on examining some shale from Ireland, with a view to its commercial utilization, and also another material more closely resembling coal, he found that when distilled separately they had something of the same properties as shale or coal of bad quality, but when mixed together, the products were different and more valuable. The effect of the mixture of coal and shale was very remarkable. Then, again, there were many instances in manufactures in which what might be called destructive distillation was carried on in such a manner that the products were entirely wasted, as was illustrated in the ordinary mode of burning bricks in an open kiln. The products in that operation were peculiar, differing from many others, and might be collected with great advantage. Other products of a different character were also worth attention. The refuse of towns, under destructive distillation, if arrangements for conducting the process could be cheaply effected, would afford a great source of profit.

The CHAIRMAN said, in the absence of further remarks upon this subject, it became his agreeable duty to move that the thanks of the meeting be given to Mr. Paul, to whom they were much indebted for the excellent paper with which he had favoured them. It was generally the endeavour of the Council that gentlemen occupying the position he had to sustain this evening should be conversant with the particular subject brought before the meeting, but, unfortunately, his friend Mr. Hawes, who was to have presided on this occasion, was prevented by illness from doing so. The subject generally was one with which he (the Chairman) was not familiar, but there was one portion of it in which he felt a special interest, viz., the manufacture of gas from coal. He could, from personal recollection, follow Mr. Paul in his history of the introduction of that important manufacture. He recollected the state of London forty or fifty years ago, when the streets were lighted with bad oil lamps, and afterwards, when the late Lord Dundonald introduced that important modification which Mr. Paul had referred to, and which for some time, though only for a short period, seemed likely to be a profitable investment of his talent and capital. Unfortunately for his lordship, but fortunately for the public at large, the application of coal gas was discovered, with what extraordinary results they all knew. Having referred to the excitement which was occasioned by the exhibition of the first experiments in street lighting by gas in Pall-mall, and at a chemist's at the corner of the Albany, in Piccadilly, the Chairman went on to remark that he had been for many years connected, as a director, with a gas company in this country which supplied six places in France; he therefore felt considerable interest in the portion of the paper which referred to that subject. A few weeks since Professor Ansted read a very able paper before this Society, in which he drew attention to many materials out of which gas might be produced; but it did not fall within the province of Mr. Paul to go much into detail on that part of the subject. With respect to the introduction of gas into France, it seemed singular, considering the large number of eminent chemists there, that they should have allowed a company in this country to invest capital for the purpose of supplying gas to towns in France; but so it was, and he was happy to say that it was not a bad investment. How far the existing vested interests in gas were likely to be interfered with by new discoveries in the production of artificial light, it was impossible for him to say. He did, however, know that scientific men had directed their attention to that subject, and he had a strong disposition to believe that some of them were likely to succeed. He had recently been present at some striking experiments in this direction, and as far as he was able to judge from what he then saw, and from the opinion of more competent authorities, it would seem as if they were on the eve of some very important discoveries in connection with artificial lighting. There had also been another element of disturbance recently introduced —he alluded to the electric light—which was now being experimented upon for lighthouse purposes at Dungeness, and the success of which seemed highly probable. These were questions which time alone would solve, but he thought it was only fair to expect that the electric light, which obviously possessed great advantages, might sooner or later be a very valuable addition to the many other sources of artificial light. With respect to the paper read this evening, he was sure all would agree that it contained interesting matter, and they must feel indebted to Mr. Paul for the able and elaborate way in which he had brought before them the results of the investigations he had made into the whole subject, and he (the Chairman) was quite sure the meeting would allow him in their name to present their thanks to Mr. Paul for his paper.

The vote of thanks having been passed,

Mr. PAUL, in acknowledging the compliment paid to him, said with regard to the quantities of petroleum oil imported into this country, his figures were based upon the authority of Mr. Macrea, who was largely engaged in that trade. Beyond that he could not vouch for the accuracy of the figures, and he stood corrected in that respect. With regard to the application of distillation to waste products, he had purposely avoided entering into that subject, because it was an open question. A great many waste products had been tried, but no results had ever been arrived at which he considered justified the treatment of the subject before this Society. Spent tan had been frequently tried, and, in one instance, on a large scale, for the purpose of making gas, charcoal, and other products, but no satisfactory results had been obtained from it, and for that reason he had avoided referring to it. With regard to the remarks of the Chairman as to the improvements that were likely to take place in the production of gas from coal and other materials, he quite agreed with that gentleman in the anticipation that very great improvements would be effected, and he did so from a very strong conviction that the present manufacture of gas, though very successful, was carried on in a way that was defective, and was capable of advantageous modification. The material used was abundant, and one of the products, coke, was so valuable that the manufacture of gas might even be looked upon as subordinate to it, and there was not so much attention paid to the quality of the gas as would be the case if it were of more exclusive importance in the manufacture. The use of petroleum oil as a gas-producing material was likely to be adopted. In Canada it was already largely used as a source of gas, and very probably in the same way that the richer cannel coal, that a few years ago was looked upon with aversion by the gas manufacturer, had now become one of the most important materials in the production of that article—so petroleum, he had no doubt, would soon obtain importance in the manufacture of gas; and if so, the road to improvement in quality would be more easy than it was at present, when gas was produced from coal.

The SECRETARY announced that on Wednesday evening next, the 3rd of June, an Extra Meeting would be held, when a paper by Mr. William Hawes, "On the Results of the International Exhibition of 1862," would be read. On this evening His Royal Highness the Duke of Cambridge, K.G., will preside. On this occasion members will only introduce one friend.

KING'S COLLEGE EVENING CLASSES.

The distribution of prizes and certificates in the department of Evening Classes, in connection with King's College, took place on the 20th instant, under the presidency of the Right Hon. W. E. Gladstone, M.P., the Chancellor of the Exchequer.

The Rev. Dr. JELF opened the proceedings.

The Rev. E. H. PLUMPTRE, the Dean of the College, said the Evening Classes were established in 1855. Their object was to meet the wants of young men in the offices and warehouses of this great City, who desired to spend their leisure hours in improving their minds and strengthening their character. The class opened with only five matriculated students—increased to seven and fifteen in the two following years. At the end of the three years they determined to admit them to the privileges of the College, and in 1858 the number of matriculated students rose to 104, but since then there had been a slight deflection in the number. On the other hand, there were the non-matriculated students. They began with 177 of those students, and in the years following the numbers were respectively 177, 147, 323, 445, and 555; but last winter there was a downward tendency, in consequence of the general commercial depression, the number being 523. Altogether, however, the number of students attending the evening classes last winter was 604, and they included members whose ages varied from 14 to 45, and even 50.

After specifying the different branches of knowledge taught, the rev. gentleman said that an important feature of the classes introduced this session was—that schools, with a large number of students, were allowed to enter and form a separate class, and to have special examinations. Of this privilege, Dr. Yeats, of the Upper and Middle Schools at Peckham, had availed himself, and as the result he would have the pleasure of introducing, for a certificate of honour, Mr. Edward M'Dermott, one of that gentleman's pupils, who had earned that mark of distinction in the division of "the principles of commerce."

The CHANCELLOR of the EXCHEQUER then proceeded to deliver the prizes and certificates to the successful competitors, addressing a few appropriate words of encouragement to each.

The following are the names of those to whom prizes and certificates of honour were awarded. Prizes and certificates of honour are of equal value, and are given to the student who stands first in the examination for each subject, provided he has gained at least three-fourths of the full number of marks. Those who received certificates of merit are omitted for want of space; these are given to all students who gain in the examination for each subject, at least three-fifths of the full number of marks:—

Divinity: — Henry William Atkinson, certificate of honour; Edward Stainton, prize; William David Ground, prize; William Farren, certificate of honour; George Galliers, prize. Latin:—George Galliers, prize; Henry William Atkinson, prize; Joseph Heptinstall Marshall, prize; George Butler, prize; James Golding, prize. Greek:—George Galliers, prize; James Bower, prize; Henry William Atkinson, prize; James Golding, prize. French:—Frank Bretherton, prize; James Robert Cole, prize; Francis Medland Phillips, prize; James Bretherton, certificate of honour; James Bower, prize; Frederick Heather, prize; Henry Wicks, prize. German:—Edward George Pearse, prize; Samuel B. Flaxman, prize; Henry Temple, prize; Thomas Adams Phillips, prize. Italian: —Edward Forbes Gaitskell, prize; Horace Hope Bloxham, prize. Spanish:—Llandaff Watson and Edward George, certificates of honour; Francis Medland Phillips, certificate of honour. English Literature:—George Butler, certificate of honour. English Composition:— George Galliers, prize; James Kirkwood, certificate of honour. Grammar and Composition:—William Honey, prize; Henry King, prize. History:—Walter Miller Taylor, prize. Geography:—Thomas William Green, prize. Mathematics: — Carlon John Lambert, prize; Frederick Joshua Whitworth, prize; William James Wood, certificate of honour; Edward Stainton, prize; James Bower, prize. Arithmetic and Book-keeping:— Stephen Henry Emmens, certificate of honour. The Principles of Commerce:—Llandaff Watson, prize, "On the best means of improving mercantile morals;" Frederick William Groves, prize; Edward M'Dermott, certificate of honour. Writing:—George Flack, prize. Chymistry:—Stephen Henry Emmens, prize. Mechanics;— William Fernie, prize. Experimental Physics:—John Simonet Scott, prize. Political Economy:—Joseph Heptinstall Marshall, prize. Logic:—Thomas de Courcy Atkins, certificate of honour; James Russell Tunks, prize. Physiology:—Robert Shakell Knight, prize. Drawing: —Arthur Debenham, prize. Botany:—Lewis Angell, certificate of merit. Zoology:—Arthur Pye Smith, certificate of merit; John Simonet Scott, certificate of merit; George Butler, certificate of merit.

Prizes to the five students who gained the highest aggregate number of marks in all the subjects respectively brought up for examination:—George Galliers, Divinity, Latin, Greek, English, History; Joseph H. Marshall, Divinity, Latin, Greek, Physiology, Political Economy; Francis M. Phillips, Divinity, French, Greek, German, Spanish; James Bower, Divinity, Latin, Greek, French, Mathematics; Thomas W. Green, Latin, German, Geography, Physics.

At the conclusion of the ceremony,

Dr. JELF expressed his thanks to the Rev. Mr. Plumptre and other professors and teachers who had assisted in conducting the classes.

On the motion of the Bishop of LICHFIELD, who was formerly Principal of King's College, seconded by Sir THOMAS PHILLIPS, a vote of thanks was passed by acclamation to the Chancellor of the Exchequer for his kindness in officiating on that occasion.

The CHANCELLOR of the EXCHEQUER said:—My Lord Bishop, ladies, and gentlemen, if it indeed were true that I have conferred upon you any remarkable favour by my presence, and by my share in the proceedings of this evening, I should have received much more than an adequate reward in the kind and cordial manner in which I have been welcomed among you; but, as the Bishop of Lichfield has very well observed, it has become almost a law of our political and social condition that those who are charged with the responsibility of public situations should from time to time take the opportunity of bringing themselves into contact, outside the walls of Parliament, with various classes of their fellow-countrymen. And permit me to say that I believe none are more willing to submit to that law than we, whose duties, whose habits, and whose privilege it is, as far as our limited opportunity allows, thus to seek occasion of meeting face to face those with whom we sympathise, and those with whom we desire to sympathise—those upon whose cultivated minds and intelligent convictions the Government of this free country in the main depends. For we feel that a great portion of the strength we may possess, of any capacity which may be accorded to us to serve our country, must depend upon our living and acting in the light of day, and upon our making ourselves thoroughly acquainted with the studies and the progress of mind and intelligence among our fellow-countrymen. It is a matter, in another view, of the greatest interest to me to come to King's College. In the first place, I never can forget how important has been the part which this institution has taken in the general movement of the age. Most of us think in this country that, whatever be the special designation under which we may be ranged by others, or under which we would like to range ourselves, the greatness and strength of England consist in reconciling and harmonising together what is old in our laws and institutions with what is new in the real demands and in the real civilisation of the time in which we live. If other countries have been less happy in their destiny—if they be precipitated upon violent and even bloody changes—if even these violent and bloody changes have failed for them to issue in stable order and extended freedom—it is because they have not had the secret of reconciling those various elements of their constitution and their condition; but they have come into violent collision one with another. In that work of reconciling and harmonising, which is the great characteristic of this country, King's College has borne a distinguished part. It was founded with one hand, as it were, laid upon the tradition of the past— upon the laws, the religion, and institutions of the country—and with the other hand pointing and beckoning onward, and announcing the intention of those who founded it and those by whom it was conducted to offer within its walls to the intelligence of their countrymen the means of meeting and satisfying every demand society was likely to make upon its resources. We have now, I venture to think, reached a time when it is no longer a question, so far as this institution is concerned, whether that reconciliation can be happily effected. I know that much has been due to the labours of the excellent Principal who now so worthily occupies that place—I know that much has been due to the ability, self-denying zeal, and unwearied assiduity of the teachers and professors of this College; but not even these powerful agencies would have availed to effect the results which have been actually achieved unless the principle had been sound, and unless the plan of the College had been found to combine a just

relation to practical experience. But I must say that to those who occupy positions such as that which I unworthily fill, opportunities like these are the means of affording many lessons. It is true that this ancient community of which we are members is likewise in one sense a young community, because it has about it the vigour, elasticity, and growth of youth; and while it expands in power we rejoice to believe that it is likewise growing more and more compact in internal solidity and strength. The meeting of class with class, to which reference has been made from several and distinct positions, tends to unite us in mind and heart. It is true I require to think that in the sphere in which I ordinarily live and move, so much has been done to consolidate the institutions of the country by improving its laws and by bettering the condition of its people. But it is also true that if we want to know what is the special security of our social strength and national prosperity we must look for it, not in what can be done by Parliaments and legislatures, but by the earnest, patient intelligence and self-denying efforts of men and public bodies, who do their duty each in his own sphere. And I know no more valuable instance of the success of such efforts than in the case of the evening classes in King's College. There is no doubt a great want to be satisfied—there is no doubt that the immense commercial progress and material activity of the age require not only stimulants but correctives. They require not that they should be repressed, not that they should be discouraged, but that they should be balanced by the higher cultivation of our nature—of our intellectual and moral and, above all, of our spiritual nature. There have been made efforts, which I cannot characterise otherwise than most gallant, to carry that higher degree of cultivation into spheres which of all others it was the most difficult for it to enter—I mean the sphere of those who are already burdened with the avocations which ordinary men may well deem to be fully equal to their strength, and such as entitle them when the ordinary labours of the day are done to retire to their repose. But it has been shown that there is in society, even in the heart of this vast and crowded metropolis, no inconsiderable portion of men—an increasing portion, I hope, and venture to believe—who are willing, even after the exhaustion of the day, to enter on new efforts, for the purpose of giving to their minds the immense advantages that are to be derived from refined education. In the profession to which I belong we do, for six months in the year, at any rate, know something of what it is, within the compass of 24 hours, to finish one day's work and then to go down to Westminster and begin another. So far I am able to sympathise with you, because that which we do under the strongest obligations—that which I venture to say we must do almost whether we like it or not — you have done by a free and spontaneous effort, and the result is recorded in the marks of distinction which I have just distributed. I for my part do not go down as far as the lowest classes in this country are concerned. It becomes a matter of increasing difficulty to induce even young men among us to make the efforts and exertions which are necessary to achieve progress in the work of education. There can be no doubt that we require in all classes of society the stimulus of necessity in order to induce us to labour and to reap through labour the reward it produces. It is impossible not to see what immense labour is required of the teachers of our schools and our Universities, who have to do with the highest classes of the country, and in how many cases it happens that the most devoted labours bestowed in the most intelligent manner and with a zeal and self-denial not to be exceeded produce but slender results; but there is a broader stratum of society, an immense mass of intelligent material, which is susceptible of every kind and degree of cultivation; and if we have come to the time when, in certain classes of society, the attractions of wealth and the outer world prove too much for the more sober attractions of learning, then it has become more than ever necessary that we should look downwards into those veins of rich material in which the English nation abounds, and that, by efforts such as these, new recruits should be continually brought forth in increasing numbers to add themselves to the body of those who are the followers of the muses or students in the inferior walks of letters and mental cultivation. It is therefore a great work to which the promoters of these evening classes have addressed themselves, and the importance of which cannot be measured even by the results attained within these walls. Much may be done here, but why should not that much be multiplied elsewhere? You have had no advantages, you have had no powers, except what are possessed by others. What a man has done a man may do; but you have lifted up a lamp in the face of the country which I trust will serve to lead others to imitate the efforts here made, and to draw forth industrious youths — not excluding other periods of life, for nothing has struck me more than the manner in which varied ages are here combined in one affectionate brotherhood and one generous emulation—to draw forth the struggling energies of youth, to satisfy its nobler aspirations, and to call it away, not only from vice and dissipation, but from sluggishness and indolence, and to encourage every man to find within himself, and to develope to the best of his abilities, the gifts with which Providence has endowed him. I rejoice to see that these evening classes have been attended by no common success. I need not say how cordially I wish the promoters continued success in their meritorious labours, nor need I assure those to whom I have had the honour of distributing, with my own hands, the prizes and certificates, how earnestly I desire that the rewards they have received, and the testimonials afforded to them to-night may be to them not merely signals and records of what they have done, but also much more—namely, incentives and encouragements to persevere in a continuing industry, to continue the cultivation of their gifts, to consider themselves responsible before God and man, every one of them, for applying and opening up to the best of their ability all the faculties they possess, and to find in the exercise of those faculties, and in their exertions in every work that is for the glory of God and the good of man, no small solace amid the difficulties of life, no small pledge that, when that life comes to its close, it may prove to have been but the harbinger of a better and a brighter one. I beg to return you my sincere thanks for the vote you have passed, and to assure you that the instruction which I receive, and the practical knowledge I derive from meeting you on an occasion like the present encourages me in the laborious profession to which I too am given, and satisfies me more and more that the increasing strength and happiness of this country will continue to be found in efforts like this—in conscientious individual exertion, each man striving for himself to do his duty to the best and utmost of his ability in that sphere and station of life to which it has pleased God to call him.

Home Correspondence.

THE SEWING MACHINE.

Sir,—Your last impression contains a letter on the Sewing Machine, in which the writer asks, "why it is only used for complicated and ornamental sewing, and not for sewing two selvages together?"

Now, sewing selvages together in the manner spoken of, forms but a small portion of the business of the seamstress; the seam not being sufficiently strong is, in almost all cases, superseded by the fell seam, which is performed in the most perfect manner by the machine.

Shirts are now entirely made by the machine, except the sewing on of buttons and working the button holes. The greater part of tailors' work is also performed by the machine, the tailor having little to do except fitting and finishing.

The fact of shirts being made throughout by the machine is sufficient to show its applicability to domestic purposes.

Mr. Reveley also asks, "why the machine uses three times the amount of thread used by hand?" This is not the case. In a machine producing the lock-stitch, one yard and-a-half of upper thread, and one yard and-a-quarter of bottom thread, are required for one yard of fine stitching; whereas, by hand, it requires three yards of thread for one yard of stitching. In coarse work the machine has a greater advantage.

The waste is also much less, for, by the machine, ten yards of stitching may be done without stopping, and by hand it is necessary to rethread the needle for each half-yard.

Mr. Reveley further intimates that a higher charge is made for sewing by the machine. This is also a fallacy, as in the best paid work, viz., collars, 9d. per gross is paid for stitching, some of the girls earning, at this rate, £1 per week. Anyone who knows the price of hand work will at once admit that this is much cheaper.

I am, &c.,

A. CLEGG.

7, St. James's-place, Hampstead-road, N.W.

WATER SUPPLY IN SOUTH AFRICA.

SIR,—The late severe drought in the South African provinces has attracted considerable attention towards the discovery of means for providing such supplies of water as shall mitigate the severity of future dry seasons. The time has hardly yet arrived for the utilisation of the waters of the Orange River, by raising the banks, constructing irrigation canals, and otherwise providing for agriculture. Much, however, may be accomplished by such associations as the "South African Irrigation Company," in damming small streams, digging tanks, and protecting the water thus stored by the encouragement of a judicious vegetation. Nor, following the idea first started by Dr. Livingstone, are artesian wells entirely hopeless. There are many favourable localities in which deep borings might be made (especially in the Dutch African republics) with every prospect of success. A late writer in *Chambers' Journal* states, in an article entitled "The Home of the Gazelle" (1862), that artesian wells have been successfully made in Algeria, in the northern borders of the Sahara, but his remarks require confirmation. Could any of your scientific readers verify the assertion?

If, as this writer declares, French engineers have succeeded in procuring a perennial supply of water south of the Atlas chain of mountains, there can be but little doubt that similar supplies could be obtained in many places in the south of the Continent.

Should any of your readers be able to direct me to any French or English publication, descriptive of the accomplishment of this alleged engineering feat, it would oblige,

Yours, &c.,

J. F. W.

2, Market-terrace, St. Leonard's-on-Sea.

Proceedings of Institutions.

LEICESTER CHURCH OF ENGLAND INSTITUTE.—The fifth annual report presented to the general meeting o the members, held on the 30th January last, says that the committee of the Church of England Institute feel justified in claiming a very fair measure of success for the Institute during the past year. The present number of junior members is 65, showing an increase of 18 over the corresponding quarter of the previous year. The subscriptions of the junior members for the year 1862 also show an increase of £3 0s. 2d. over those for 1861. The Committee believe that the classes of the Institute were never in a more flourishing condition than at present. There could not be a more satisfactory proof of the interest taken by the members in the work of self-education and self-improvement. The following statement will show the present condition of the classes, and the numbers by which they are respectively attended. It will of course be understood that in many cases the members of one class attend others also:—Arithmetic, 15; English history, 6; music, 13; Latin, 6; German, 5; Greek, 2; essay and discussion, 8; French, 26. The best thanks of the Committee are due to the teachers of the several classes. The Committee in their last report held out the hope of aiding in the establishment of reading-rooms for the working classes in various parts of the town. One such reading-room has been established during the past year in Union-street, out of High-street, and is aided by the loan of some periodicals from the Institute. The Committee would gladly extend the operations of the Institute in this direction. The Treasurer's statement shows that the expenses have been £94 2s. 6d., and that there is a balance due to the treasurer of £15 8s. 8d.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Entomological, 7.
British Architects, 8.
R. Asiatic, 3.
Royal Inst., 3. General Monthly Meeting.
Royal United Service Inst., 8½. Lieut. P. H. Colomb, R.N., "Naval and Military Signals."

TUES. ...Civil Engineers, 9. President's Annual Conversazione.
Photographic, 8.
Ethnological, 8. Professor Tagore, "A Discourse on the Institution and Formation of the Caste System in India, Aryan Polity."
Royal Inst., 3. Prof. Tyndall, "On Sound."
Architectural Museum, South Kensington, 7½. Mr. J. C. Robinson, "On the Art Collections at South Kensington, considered in reference to Architecture."

WED. ...Society of Arts, 8. Mr. William Hawes, "On the Results of the International Exhibition of 1862."
Geological, 8. 1. "On the Relations of the Sandstones of Cromarty with Reptilian Footprints." By the Rev. George Gordon LL.D., and the Rev. J. M. Joass; with an introduction by, and communicated by, Sir R. I. Murchison, K.C.B., &c. 2. Mr. J. Prestwich, "On the Section at Moulin-Quignon, and on the peculiar character of some of the Flint Implements found there." 3. Mr. J. Carrick Moore, "On some Tertiary Shells from Jamaica." With a Note on the Corals, by P. Martin Duncan, M.B. Lond., F.G.S. 4. Mr. J. Denis Macdonald, "Description of a new Fossil *Thecidium* from the Miocene Beds of Malta." Communicated by the President.

THURS...Antiquaries, 8½.
Linnæan, 8. 1. Mr. S. J. A. Salter, "On a sexual Monstrosity in the genus *Passiflora*." Messrs. R. Trimmen and Charles Darwin, "On the fertilisation of *Disa grandiflora*, *L.*"
Chemical, 8. Mr. Marcellin Berthelot, "Synthetic Methods in Organic Chemistry."
Royal Soc. Club, 6.
Royal Inst., 3. Prof. Ansted, "On Geology."

FRI. ......Philological, 8.
Royal Inst., 8. Mr. John Ruskin, "On the Forms of the Stratified Alps of Savoy."
Archæological Inst., 4.
R. United Service Inst., 3. Lieut.-Col. A. Strange, "Telescopes and Opera Glasses for use in the Field or at Sea."

SAT.......Inst. of Actuaries, 3. Annual Meeting.
Royal Inst., 3. Professor William Thomson, "On Electric Telegraphy."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 15th April, 1863.

77. Bills—Local Government Act (1858) Amendment (amended).
78. ,, Telegraphs (as amended on Consideration of Bill as amended).
North America (Neutral Vessels and Mails)—Correspondence (No. 5).
North America (Neutral Rights and Duties)—Correspondence with Mr. Adams (No. 6).

SESSION 1862.

307 (c.) Poor Rates and Pauperism—Return (C).

Delivered on 16th April, 1863.

152. Naval Cadets—Return.
155. British Museum—Return and Estimate.
166. Exchequer Bonds—Account.

Delivered on 17th April, 1863.

160. Navy (Ships)—Return.
79. Bill—Savings Banks.
Army (Employment of Soldiers and their Children in Trades)—Report.

Copies of the under-mentioned Papers, presented by command, will be delivered to Members of Parliament applying for the same at the Office for the Sale of Parliamentary Papers, House of Commons:—

19. Turnpike Trusts—Fifth Report from Secretary of State.
20. Sanitary Condition of Barracks and Hospitals—Appendix to Report of 1861 (Interim Reports).

Delivered on 18th and 20th April, 1863.

156. Change of Name—Return.
157. Grants of Arms—Return.
168. Crown Lands (Ireland)—Returns.
172. Commercial Harbours—Return.

Delivered on 21st April, 1863.

151. Rotherham Sanitary Condition—Reports, &c.
162. Brewers' Licences—Returns.
170. Chapters—Return.
173. Army (Colonies)—Return.
174. Registry of Deeds (Ireland)—Return.
177. New Zealand—Correspondence.
176. Army (Manufacturing Establishments)—Return.

Delivered on 22nd April, 1863.

136. Savings Banks (Number of Depositors, &c.)—Accounts.
136 (1.) Savings Banks (Sums Paid or Withdrawn, &c.)—Return.
137. National Debt—Account.
158. Naval Prize Money, &c.—Return.
169. Public Income and Expenditure—Account.
178. Russian War, 1855 (Kertch and Yenikale)—Estimate.
179. Prince Consort's Memorial—Estimate.
29. Railway and Canal, &c. Bills (204. Birmingham and Sutton Coldfield Extension Railway; 205. Dublin Metropolitan Railway; 206. London, Brighton and South Coast Railway (New Lines to the Crystal Palace, &c.) 207. London Railway (Victoria Section); 208. Lynn and Sutton Bridge Railway; 209. Northumberland Central Railway; 210. Oswestry and Newtown and other Railway Companies Amalgamation, &c.; 211. Bonelli's Electric Telegraph Company)—Board of Trade Reports.

SESSION 1862.

396. Colonies (Public Officers)—Return.

Delivered on 23rd April, 1863.

147. Colonies (Area, Population, &c.)—Return.
148. Sugar Duties (Mauritius)—Return.
163. Brazil—Return.
165. Sewage Commission—Return.
167. Ecclesiastical Commission (Ireland)—Annual Report, &c.
171. Cathedral and Collegiate Churches—Return.
81. Bills—English Church Services in Wales (amended).
83. ,, Municipal Elections.
85. ,, Land Drainage (Provisional Orders).
86. ,, Poor Removal.
87. ,, Illegitimate Children (Ireland)—Lords Amendments.
Salvador—Treaty of Friendship, Commerce, and Navigation.

SESSION 1862.

476. Emigration—Return.

Delivered on 24th April, 1863.

29. Railway and Canal, &c. Bills (212. London, Chatham, and Dover Railway (No. 1)—Board of Trade Report.
181. Army (Employment of Soldiers in Trades)—Return.
183. Immigrants and Liberated Africans—Return.
84. Bills—Local Government Supplemental.
88. ,, Marriages &c. (Ireland) (amended).

SESSION 1862.

307 (A IX.) Poor Rates and Pauperism.—Return (A.)

SESSION 1861.

493. Poor Rate Exemption—Return.

Delivered on the 25th and 27th April, 1863.

101 (1.) Churchyards—Further Return.
145. Increase and Diminution (Public Offices)—Abstract of Accounts.
186. Metropolis Turnpike Roads—37th Report of Commissioners.
187. Roman Catholic Prisoners (Perth) Copy of Correspondence.
188. Militia (Ireland)—Returns.
193. National Portrait Gallery—6th Report of Trustees.
194. British North America (Arms, &c.)—Return.
118. East India (Chinchona Plant)—Return.
159. Australian Coal—Report of Commodore Seymour.
185. Queen's Aides de Camp, &c.—Return.
189. Judgments for Debts—Return.
190. Poor Law (Lancashire Unions)—Returns.
214. Registry of Deeds (Ireland)—Return.

91. Bills—Customs and Inland Revenue.
89. ,, Metropolitan and City of London Police Amalgamation.
Civil Service Commissioners—8th Report.
North America—Correspondence respecting Dispatch of Letters by Private Ships to Matamoros (No. 7.)
Coolie Immigration into the Island of Reunion from British India—Despatch.

Delivered on 28th April, 1863.

213. Court of Chancery—Abstract of Return.
45 (3.) Trade and Navigation Accounts (31st March, 1863.)
209. Railways (Entailed Estates)—Lords Report.
180. Survey (United Kingdom)—Returns.
190. Navy (Iron-Plated Ships)—Return.
195. Paper and Rags—Accounts.
204. Established Church (Ireland)—Return.
92. Bill—Courts of the Church of Scotland.
Smyrna (Fines inflicted)—Return.

Delivered on 29th April, 1863.

192. Paupers (Ireland)—Return.
197. Metroplitan Railways—Copy of Mr. Bazalgette's Report.
201. Education—Return.
82. Bill—Church Building and New Parishes Acts Amendment.
North America (Confederate Agents in England)—Correspondence with Mr. Adams (No. 8).
North America (Enlistment of British Subjects in the Federal Army)—Correspondence with Mr. Adams (No. 9.)

SESSION, 1862.

307 (A X.) Poor Rates and Pauperism—Return (A.)

Delivered on 30th April, 1863.

198. Tenure and Improvement of Land (Ireland)—Abstract of Returns.
215. Kitchen and Refreshment Rooms (House of Commons)—Report from Committee.
93. Bill—Naval Medical Supplemental Fund Society Winding-up Act (1861) Amendment.
North American (Seizure of Mail Bags on board the *Adela*)—Extract from a Despatch (No. 10).
Insurrection in Poland—Correspondence.

Delivered on 1st May, 1863.

191. Navy (Dockyard Officers, &c.)—Return.
203. Record Office—Return.
206. Army—Return.
212. East India (Civil Service)—Return.
217. Government Property—Return.
226. Ramsgate Harbour—Statement of Receipts and Payments, &c.
227. Salmon Fisheries (Ireland)—Return.
164. East India (Waste Lands)—Return.
94. Bills—Thames Embankment (North Side) amended by the Select Committee).
95. ,, Anchors and Chain Cables.
99. ,, Local Government Act (1858) Amendment (Lords Amendment).

Delivered on 2nd and 4th May, 1863.

175. China War (Votes of Credit)—Account.
196. Procession and Illumination Accidents (Metropolis)—Returns.
223. Seamen's Savings Banks—Account.
224. Mercantile Marine Fund—Account.
218. East India (Bheels of Kandeish)—Return.
216. Electric Light—Copies of Reports, &c.
222. Merchant Seamen's Fund—Account.
228. East India (Oude Claims)—Copy of Despatch.
229. Yorkshire (West Riding)—Return.
230. Bann Navigation—Returns.
101. Bills—Jurors Remuneration (amended).
102. ,, Watchmen in Towns (Ireland).
98. ,, Sheep, &c. Contagious Diseases Prevention.
100. ,, Stock Certificates to Bearer (amended.)

Delivered on 5th May, 1863.

90. Bills—Poisoned Grain Prohibition.
103. ,, Accidents Compensation.

Delivered on 6th May, 1863.

210. East India (Railways, &c.)—Return.
225. Church Lench School—Return.
96. Bills—Poor Removal (No. 2).
97. ,, Inland Revenue.

Delivered on 7th May, 1863.

211. East India (Consulting Railway Engineers)—Returns.
221. Fortifications—Account.
104. Bills—Uniformity Act Amendment.
111. ,, Security from Violence (amended).
Poland—Further Correspondence (Part 2.)

Delivered on 8th May, 1863.

219. Thames Embankment (North Side)—Report from Committee.
221. Fortifications—Account (a corrected copy).
233. Procession (7th March)—Return.
234. County Treasurers (Ireland)—Account.
242. Steam Postal Service (Australia, &c.)—Return.
231. Fisheries (Ireland)—Copy of Correspondence.
112. Bills—New Zealand Boundaries.
113. ,, Offences (South Africa).
Public General Acts—Cap. 8, 9, 10, and 11 (Delivered on 4th May).

Delivered on 9th and 11th May, 1863.
146. Superannuations (Public Offices)—Account.
182. Works and Public Buildings—Abstract Accounts.
207. Royal Forests and Woodlands—Return.
236. Holyhead Packet Harbour—Return.
237. Navy (Iron-Plated Ships)—Return.
238. Floating Piers (Thames)—Return.
244. Sevastopol (Arms, &c.)—Return.
245. Poor Law (Patrick Bourke)—Return.
105. Bills—Sale of Mill Sites, &c. (Ireland).
109. ,, Pier and Harbour Orders Confirmation.
110. ,, Harwich Harbour.
114. ,, Stock Certificates to Bearer (as amended in Committee, and on Consideration, as amended).
103. ,, Drainage and Improvement of Land (Ireland).
108. ,, Volunteers.
115. ,, Sheep and Cattle (Scotland).

SESSION 1862.
307 (A XI). Poor Rates and Pauperism—Return (A).

Delivered on 12th May, 1863.
39 (1). Coroners' Inquests—Further Return.
132 (1). East India (Cotton)—Further Return.
154. Harbours of Refuge—Return.
251. Lord Chancellor's Benefices—Return.
246. Lisburn Election Petition Withdrawal — Report from the General Committee of Elections.
117. Bill—Salmon Fisheries (Scotland) Act Continuance.

Delivered on 13th May, 1863.
232. Ramsgate Harbour—Abstract of Supplementary Account.
237. Navy (Iron-Plated Ships)—Return (a corrected Copy).
243. Public Debt—Account.
250. Thames Conservancy—Paper.
252. Voters (Scotland)—Return.

Delivered on 14th May, 1863.
57. Post Office Packet Service—Estimate.
203. Union of Benefices Act—Return.
247. Lighthouses, &c., Act—Paper.
248. Income Tax—Return.
253. Dublin Port—Account.
254. Thames Embankment (North Side) New-street—Return.
107. Bills—Sheriff Courts (Scotland).
116. ,, Court of Session (Scotland).
118. ,, Marriages Registration (Ireland) (amended).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 22nd*, 1863.]

Dated 21st January, 1863.
192. H. Caro and J. Dale, Manchester—Imp. in obtaining colouring matters, part of which imp. is also applicable to dyeing and printing.

Dated 19th February, 1863.
451. R. P. Roberts, Kennington-oval, Surrey—Improved axle boxes for carriages or vehicles. (A com.)

Dated 4th March, 1863.
603. J. F. Gits, Antwerp—An improved furnace for the revivification of animal charcoal.

Dated 20th March, 1863.
751. J. Brigham and R. Bickerton, Berwick-upon-Tweed—Imp. in reaping or mowing machines.

Dated 23rd March, 1863.
787. L. Christofleau, 60, Boulevart de Strasbourg, Paris—Imp. in fire-arms.

Dated 14th April, 1863.
940. R. A. Brooman, 166, Fleet-street—Imp. in hardening and colouring gypseous limestone and sand and calcareous stones. (A com.)

Dated 16th April, 1863.
955. J. L. McLay, Liverpool—Imp. applicable to mariners' compasses.
957. C. Terrett, Clifton-place, Stapleton-road, Bristol—Imp. in preventing incrustation in steam boilers.
959. W. Oldfield, Noble-street, St. Luke's—Imp. in the construction of locks, applicable to despatch and other boxes, writing and dressing cases, and other similar receptacles.
961. T. A. W. Clarke, Leicester—An improved construction of shuttle driver, and apparatus for working the same.

Dated 17th April, 1863.
963. R. Knight, Dunkirk, France—Imp. in treating and preparing iron, copper, and other wires for telegraphic and other uses for the purpose of preserving them from corrosion or decay.
965. J. Richmond, T. Richmond, and D. Harling, Burnley, Lancashire—Certain imp. in looms for weaving.
967. R. C. Clapham, Walker, Northumberland — Treating the waste liquors from bleaching powder stills in order to obtain hydrochloric acid and other products therefrom.
969. W. Massingham, Boston, Lincolnshire—Imp. in apparatus for cooling liquids.
971. B. J. Webber, Newton Abbott, Devonshire—Imp. in apparatus for separating corn from the ears, and for combing straw.

Dated 18th April, 1863.
973. W. S. Macdonald, Manchester—Imp. in apparatus for drying animal, vegetable, and mineral substances.
975. W. B. Burden, Malvern, Worcestershire—Imp. in wheels and axles applicable to locomotives, carriages, and paddle wheels.
977. T. Hunt, Banbury—Improved apparatus for obtaining motive power.

Dated 20th April, 1863.
979. C. Randolph and J. Elder, Glasgow—Imp. in surface condensers.

Dated 21st April, 1863.
985. A. Ford, Stewart's-buildings, Battersea-fields, and R. Rigg, 3, Great Winchester-street—An improved method of re-forming and re-using old or waste vulcanised india rubber.
987. J. Heap, Ashton-under-Lyne—Imp. in adjustable wrenches for nut pipes and pins.
991. J. W. Nottingham, Clayton-place, Kennington-road—Imp. in two-wheeled vehicles.
993. H. Donald, Johnstone, Renfrew, N.B.—Imp. in machinery or apparatus for bending or straightening metal plates.
995. W. C. Cambridge, Bristol—Imp. in the construction of harrows.

Dated 22nd April, 1863.
1001. T. Grace, Bristol—Imp. in reaping and mowing machines, part of which imp. is applicable to other useful purposes.
1003. E. J. Jeffs, 1A, St. James's-street, Old Steyne, Brighton, and T. Turner, Stanley-bridge Wharf, King's-road, Chelsea—Imp. in the making and constructing of carriage ways.

Dated 23rd April, 1863.
1007. J. W. Proffitt, Park-road, Peckham, and W. L. Duncan, 218, Pembroke-cottages, Caledonian-road—An improved mode and apparatus for distributing sand or any other suitable substance or substances on the railways and tramways.
1009. R. Richardson, Great George-street, Westminster — Imp. in railway permanent way.
1011. W. Clark, 53, Chancery-lane — Imp. in the manufacture of tiles, and in apparatus for the same. (A com.)
1013. P. McGregor, Manchester—Imp. in machinery for spinning and doubling.

Dated 24th April, 1863.
1015. J. B. Daines, 5, Little Argyle-street West, Middlesex—Imp. in the preparation of stone, plaster, compo, iron, wood, and such like substances, so as to preserve them from decay.
1017. J. Lambert, Sheffield—Imp. in ball cocks.
1023. J. Thompson, Bilston—Imp. in the manufacture of barrels for fire-arms and other descriptions of tubes, and in apparatus or machinery to be employed for that purpose.
1025. W. A. Shaw, New York—A mode of lining lead pipe with tin or its alloys.

Dated 25th April, 1863.
1029. L. de Breanski, Greenwich—Improved apparatus for fixing drills, which invention is also applicable for fixing apparatus for raising, supporting, and suspending weights, and for other analogous purposes.
1031. A. H. Clark and H. Hope, Birmingham—Imp. in valves for water, steam, and gas.
1033. J. P. Nunn and E. B. Nunn, Royston, Cambridgeshire—Imp. in hoes and cultivators.
1037. F. Walton, Chiswick—Imp. in the manufacture of fabrics for covering floors and other surfaces, and in apparatus employed therein.
1039. I. Dimock, Manchester—Imp. in machinery for cleaning, sorting according to size, and doubling silk and other threads.
1043. A. V. Newton, 66, Chancery-lane—Imp. in breech-loading fire-arms. (A com.)

Dated 27th April, 1863.
1045. S. Osborne, Bayswater—An improved machine for unwinding crinoline steel.
1047. H. E. Carchon and E. F. Raybaud, 17, Rue Thevenot, Paris—Imp. in the manufacture of hats and bonnets, and mode of preparing feathers to be used in the said manufacture.
1049. W. E. Gedge, 11, Wellington-street, Strand—Imp. in twyers or blast pipes, and in apparatus connected therewith. (A com.)
1051. W. Richards, Birmingham—Imp. in ordnance, fire-arms, and cartridges.
1053. F. Bennet, Holywell, Flintshire—An improved method of condensing lead and other metallic fumes and vapours from furnaces.
1055. W. H. James, Old Kent-road—Imp. in indicating the locality of fire, applicable also to denoting the position of ships.

Dated 28th April, 1863.
1059. S. Ingledew, Stockton-on-Tees, Durham—Certain imp. in the method of obtaining iron from its ore, and in the subsequent treatment thereof for converting the product into a metallic state, and in apparatus connected therewith.
1061. S. Crabtree, Bradford—Imp. in balling motions.
1063. A. Kinder, 20, Cannon-street—Imp. in the manufacture of sheet metal and in ingots or plates of metal, and in the machinery or apparatus employed therein.
1069. T. Moore, 27, Leadenhall-street—Imp. apparatus for laying down, protecting, and controlling submarine cables for telegraphing from vessels moored off a coast to the shore.
1071. G. Davies, 1, Serle-street, Lincoln's-inn—An improved machine for agitating and mixing substances.—A com.
1073. Capt. H. Y. D. Scott, R.E., Brompton Barracks, near Chatham—Imp. in the manufacture of cementitious substances.

Dated 29th April, 1863.

1075. J. Rowley, Stafford-street, Peckham, Surrey—Imp. in the means or apparatus employed for recovering the fibres of wool from fabrics or materials composed of wool combined with cotton or other vegetable substances.
1077. W. Tarr, 112, York-street, Oxford-street, and E. Tarr, 40, Cavendish-street, Oxford-street, Manchester—An imp. in pianofortes.
1079. E. Leigh and F. A. Leigh, Manchester—Imp. in cotton gins and in the method of driving the same, part of which improvements is applicable to other purposes.
1081. H. Worms, 27, Park-crescent, Portland-place—Imp. in apparatus for elevating guns.
1083. F. Gretton, Burton-upon-Trent, Staffordshire—Imp. in heating the contents of mash tuns.
1085. H. W. Ripley, Montpellier Lawn, Cheltenham—Imp. in apparatus for printing fibrous materials. (A com.)

Dated 30th April, 1863.

1087. J. Wibberley, Manchester—Imp. in machinery or apparatus for winding cotton, silk, wool, or other threads on spools or reels.
1089. W. Clark, 53, Chancery-lane—Imp. in the manufacture of hydrocyanite of ammonia and of alkaline and earthy cyanides. (A com.)
1091. E. G. Brewer, 89, Chancery-lane—Imp. in welding and rolling metals, and in machinery connected therewith. (A com.)
1093. J. Appleby, Manchester — Imp. in propelling ships and barges.

Dated 1st May, 1863.

1095. J. M. Gray, 80, Prince Edwin-street, Liverpool—Portable apparatus or instruments for rivetting, caulking, chipping, and otherwise operating upon and treating metals and other substances.
1096. E. Jones, Charlton, Kent—Imp. in drainage and in water-closets, and in the means and apparatus necessary for the same respectively.
1097. W. Clissold, Dudbridge, Gloucestershire—Imp. apparatus for fulling woollen cloths and washing and cleansing woven fabrics.
1099. J. Badart, 9, Bishopsgate-street—Imp. in the preparation of rape seed cake, linseed cake, poppy seed cake, niger seed cake, sesseme seed cake, and ground nut cake.

Dated 2nd May, 1863.

1101. W. T. Smith, Dalston, Middlesex—Imp. in washing machines.
1103. G. Burt, Birmingham — Imp. in machinery for punching, stamping, or forging metals.
1105. S. J. Bartlett, Maidstone—Imp. in apparatus for straining and drawing off liquids.
1107. J. T. Oakley and T. Oakley, Grange-road, Bermondsey—Imp. in the construction of garden pumps, part of which said improvements is applicable to fire-engines and other hydraulic machines.

Dated 4th May, 1863.

1109. E. R. Southby, Wareham, Dorset—Imp. in the extraction of scents from plants, flowers, and other odoriferous substances.
1110. J. Fortune, Morton, near Bingley, in York—Improved means of joining or fastening together lace, blond, quilling, or similar materials.
1111. J. M. Johnson, E. Johnson, and C. Johnson, Castle-street, Holborn, and L. Bertling, Ironmonger-street, St. Luke's—Imp. in the production of show tablets, advertisements tablets, name plates, architectural facings and decorations, and other ornamental, decorative, and inscriptive articles.
1113. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in springs for railway carriages and other purposes.

Dated 5th May, 1863.

1115. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of wrought iron and steel, and in the apparatus to be employed therein. (A com.)
1116. W. Walsh, Manchester—Imp. in obtaining and purifying oxalate of soda, which improvements are also applicable to the manufacture of oxalic acid.
1117. R. G. Kent, Old Crompton-street, Soho—Imp. in the construction and arrangement of shades and reflectors for gas lights.
1119. W. Boothroyd, Halifax—Imp. in stationary engines or apparatus for obtaining motive power.
1123. J. H. Knott, Nelson-square, Blackfriars-road—Imp. in lamps.
1125. W. C. Wilkins, Long acre—Imp. in lamps.

Dated 6th May, 1863.

1127. T. Sagar, Burnley, Lancashire, and J. Wilkinson—Certain imps. in power looms for weaving.
1129. W. E. Gedge, 11, Wellington-street, Strand—An improved toy. (A com.)
1131. S. Mac-Kellen, Manchester—Certain imp. in watches and other time-keepers.
1132. I. M. Singer, Glasgow—Imp. in sewing machines.
1133. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in machinery or apparatus for forging and dressing horse-shoe and other nails. (A com.)
1135. A. Sturrock, Doncaster — Imp. in locomotive engines and tenders.

Dated 7th May, 1863.

1148. T. Holliday, Huddersfield—An improved blue colouring matter.

Dated 8th May, 1863.

1150. A. Skwarcow, 24, Leadenhall-street—Imp. in the construction of turntables. (A com.)
1152. J. S. Grimshaw, Huncoat, near Accrington, Lancashire—Imp. in looms for weaving.
1156. W. Clark, 53, Chancery-lane—Imp. in coating wrought or other iron to protect it from corrosion or oxydation. (A com.)

Dated 9th May, 1863.

1162. S. Wilson, Manchester—Imp. in hoops or bands for fastening bales, and in machinery or apparatus for making the same.
1164. J. Norie, Glasgow—Imp. in making moulds for casting, and in apparatus therefor.
1170. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of lamp black. (A com.)
1172. J. Burrell, 85, Back Church-lane, Whitechapel—Imp. in machinery for cutting the teeth of bevelled wheels.
1174. J. Burrell, 85, Back Church-lane, Whitechapel— Imp. in salinometers.

Dated 11th May, 1863.

1178. R. Burgess, Machester—Imp. in machinery or apparatus for marking, etching, or engraving cylindrical and other surfaces.
1182. J. Parkinson, Tichbourne-street, Regent-street—A new or improved mode of manufacturing tablets to be used for monumental purposes.

Dated 12th May, 1863.

1188. W. Mattison and G. Barker, Leeming Bar, near Bedale, Yorkshire—Imp. in grass mowing and reaping machines.
1194. H. L. Emery, Sloane-street, Chelsea—Imp. in apparatus for manufacturing saws suitable for ginning cotton and for other uses. (A com.)
1196. R. A. Brooman, 166, Fleet-street—Imp. in spring mattresses, sofas, chairs, seats, and similar articles. (A com.)

Dated 13th May, 1863.

1198. H. Rushton, 48A, Northampton-road, Clerkenwell—Imp. in head dresses.
1202. F. Holthausen, 40, Rue de Richelieu, Paris—An improved portable copying press.
1204. V. J. Cassaignes, 8, Rue des Fosses, St. Jacques, Paris—Imp. in stereoscopes.
1206. B. Lambert, 35, Lothian-road, Camberwell New-road—Imp. in paper makers rag or pulp engines.

Dated 14th May, 1863.

1210. T. Lawrence, Salford, Lancashire—Certain imp. in machinery or apparatus used in the processes or operations of drying, dressing, brushing, waxing, and finishing fabrics.
1212. A. Pilbeam, Glasgow—Imp. in sewing machines.
1214. J. Burrell, 85, Back Church-lane, Whitechapel—Imp. in the construction of cocks or valves.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1163. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the manufacture of paper, stuff, or pulp, from certain vegetable substances. (A com.)—9th May, 1863.
1218. G. T. Bousfield, Loughborough-park, Brixton, Surrey—Imp. in machinery for rolling, grinding, and cutting files and rasps. (A com.)—14th May, 1863.

PATENTS SEALED.

[*From Gazette, May 22nd*, 1863.]

May 22nd.

3167. T. M. Elton.
3170. J. Steinthal.
2171. F. Palling.
3174. J. R. Danks, B. P. Walker, and R. P. Walker.
3176. J. Halford.
3179. T. Keyworth.
3180. W. T. Rowlett.
3181. D. Auld and D. Auld, jun.
3183. D. Veerkamp and C. F. A. Van Trigt.
3415. G. E. M. Gerard.
3422. F. Parker.
3473. H. A. Bonneville.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4558	May 15.	Improved Photographic Printing Frame ...	Walter Blott........	532A, New Oxford-street.
4559	,, 20.	Incubator	Hugh Hanly	1st Life Guards, Regent's-park, N.W.
4560	,, 26.	Machine for Freezing, Cooling, and Churning	Rupert Rains	4, Crescent, Bridge-street, Blackfriars.

Journal of the Society of Arts.

FRIDAY, JUNE 5, 1863.

WOOD CARVING.

The Exhibition of specimens sent in competition for the prizes offered by the Society of Arts and the Society of Wood-Carvers, as well as other specimens of wood-carving, will be open to members and their friends on Tuesday next, the 9th June.

CONVERSAZIONE.

The Council have arranged for a Conversazione at the South Kensington Museum, on Friday evening, the 12th June, for which cards have been issued.

ANNUAL DINNER.

The One Hundred-and-Ninth Anniversary Dinner of the members and their friends will take place at St. James's Hall, Piccadilly, on Saturday, the 20th inst., at Six o'clock punctually. The Solicitor-General, Sir Roundell Palmer, M.P., will preside.

Applications for tickets (price One Guinea each) should be made to the Financial Officer, at the Society's House, on and after Thursday, the 11th inst. Members desiring to have seats reserved for themselves and their friends, must take their tickets not later than Wednesday, the 17th inst.

CENTRAL COMMITTEE OF EDUCATIONAL UNIONS.

A meeting of the Central Committee will be held on Thursday, the 11th inst., at two o'clock.

TWELFTH ANNUAL CONFERENCE.—NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The Twelfth Annual Conference of the Representatives of the Institutions in Union and the Local Educational Boards with the Council will be held on Friday, the 12th June, at Twelve o'clock, noon. Sir Thomas Phillips, F.G.S., Chairman of the Council, will preside.

Secretaries of Institutions in Union are requested to forward, as soon as possible, to the Secretary of the Society of Arts, the names of the Representatives appointed to attend the Conference. The Chairmen or other Representatives of the Local Boards of Examiners are invited to attend the Conference.

The Council will lay before the Conference the Secretary's Report of the Proceedings of the Union for the past year, and the Results of the Examinations of the Central Committee of Educational Unions. The time for holding the Society's Examinations next year will also be considered.

The following subjects are suggested for discussion:—

1. Whether in the Elementary Examinations, in addition to the uniformity already, to a great extent, secured by the supply of the same papers of questions to the various Local Boards, further uniformity may not be obtained by a plan for aiding the Local Examiners in the estimation of the Candidates' answers?
2. Whether it is desirable to dispense with the "Previous Examinations" in *special* subjects?
3. The propriety of the Society of Arts employing an Organising Agent to visit the various Institutions.
4. How far is it desirable and practicable to combine the objects of the Working Men's Clubs—viz., amusements, draughts, chess, refreshment, &c., with the educational objects of Mechanics' Institutes, and whether the members of Institutes can be retained during the summer, by providing healthful recreation and studies requiring illustration from nature?
5. The propriety of holding one or more meetings of Representatives of Institutes about the time of the Annual Conference at the Society of Arts, for the purpose of reading short papers or essays on various subjects of interest.
6. The expediency and means of establishing competitive exhibitions of the Works of Art Workmen and Skilled Artisans.
7. Whether it would be expedient that Apprentices should be examined, at the conclusion of their term, in the principles and practice of their craft or business, and Certificates granted to them?
8. Whether it would not be desirable for Institutions to give Testimonials to their members, and to keep registers of those so recommended by other Institutions?
9. The expediency of holding local competitions in Shorthand.

Notice of any other subjects which Representatives may desire to introduce to the notice of the Conference should be given to the Secretary of the Society of Arts, to whom should also be forwarded a copy of the last Annual Report of each Institution.

Representatives of Institutions and Local Boards attending the Conference are invited to the Society's Conversazione, at the South Kensington Museum, in the evening of the same day (12th June), and will receive cards on application at the Society's House on the day of the Conference.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following additional names have been received up to the 3rd inst.:—

Bradley, John	£1	1	0
Cammell, Charles	1	1	0
Heath, Robert	1	1	0
Hutchinson, John	1	1	0
Willis, James	1	1	0

COMMITTEES OF REFERENCE.

ECONOMIC AND SANITARY SCIENCE.

The Committee met on Friday afternoon, 29th ult., Thomas King Chambers, Esq., M.D., in the chair.

The Secretary (in the absence of the Chairman of the Council) having explained the views of the Council with regard to these committees,

Mr. Michael said there was one subject of importance from which considerable benefit might accrue to the country by such an organisation as this committee could initiate, namely, facilitating sanitary operations in town and country. After pointing out the difficulties experienced by Local Boards of Health, in the opposition of owners of private property, lodging houses, &c., he suggested that it would be desirable to ascertain, by conference or correspondence with Local Boards of Health, what amendments in the Local Management Act would enable bodies entrusted with the guardianship of the public health to carry out more satisfactorily the provisions of the Act.

Dr. Caplin said he had been a member of a sanitary committee in Manchester, and had not met with the difficulties alluded to by the preceding speaker. As far as his own experience went, he believed that compulsory legislation would not meet the evil complained of, and that sanitary improvements must be looked for from moral persuasion alone.

Dr. Waller Lewis thought the subject introduced by the first speaker was one which might be properly taken up by this Committee. They all knew that in carrying out drainage, and the application of sanitary measures to large or small towns, the first object was to get rid of the sewage matters. The great difficulty which met them at the present time was the ultimate disposition of the aggregate sewage, which had unfortunately created an evil almost as great as not draining at all, viz., that the great mass of the sewage was directed into the nearest river or stream, occasioning constant complaints from all parts of the country. In the case of the town of Croydon there had been almost incessant litigation on this subject between the Board of Health and the persons owning the stream into which the sewage matters were discharged. Action after action had been tried, and large damages had been given against the Local Board of Health on account of the destruction of fish through the pollution of the river. Water which formerly was potable was no longer fit to be drunk, and there had been loud complaints on the subject. It was an admitted difficulty, because they had not the means of deodorising and getting rid of the fœcal and ammoniacal matters contained in the sewage. Although they might precipitate the solid matter and strain the liquid and pass it out colourless, and apparently inodorous and tasteless, yet when it was discharged into a stream that was stagnant in part of its course, there was so much nitrogenous matter left in it, that although the stream did not become thick and turbid, it was nevertheless polluted. If by the aid of chemistry combined with mechanics they could get rid of this evil, one obstacle would be removed which now prevented many towns from coming under the operation of the Local Health Acts.

Mr. Robert Rawlinson had listened with much interest to the remarks of Mr. Michael. As one who had been engaged in carrying out the Local Government Acts, and as a member of the Royal Commission for inquiring into the subject adverted to by Dr. Waller Lewis, he (Mr. Rawlinson) did not wish to say that this committee could not do good service by taking the question up, but he thought he was in possession of information which carried the question further than any which those gentlemen could have the means of being acquainted with. The Local Government Act, as they were aware, was a permissive act, and was in force in 400 or 500 towns. From time to time, as difficulties had arisen, amendments had been made in that act, and with respect to the cases alluded to by Mr. Michael, he had accompanied a deputation to the government that day with the view of enabling local boards to carry out private improvements, to apportion the expenses of the same upon the owners of the property, and to receive the money from them when the works were executed and the appointment was made. With regard to the sewage of towns and the ultimate disposal of it at the outlet, experiments were now being made at Rugby, in the application of the liquid sewage to the grass land in that neighbourhood. A parliamentary committee was appointed last session to take evidence upon that question, and various opinions were given. There was an opinion on the part of many persons that the excretal matter of large towns was of enormous commercial value. That opinion was held by able men, who gave chapter and verse for all they advanced; but he thought, in coming to this sanguine conclusion, they did not take one great element in the question into calculation. He would briefly refer to some of the elements they had to deal with in grappling with the sewage of large towns at the outlet. Whatever fertilising value might be put by the chemist upon the sewage itself, they must deduct an enormous per centage from it when they came to use it, for this reason—the flow of the sewage was constant and unceasing; then, as to the idea of tanking it, he could only use one word, that was, it was monstrous. Any money expended upon tanks was an absurd waste of the capital of the ratepayers, because it established a monster nuisance, which they had not the means of getting rid of; whatever they did with the sewage, they must get rid of it at once; whether it was deposited upon the land, or the solids were thrown down, they must do it promptly, and without tanks. Take the case of London. The water supply amounted on the average to a hundred millions of gallons in the 24 hours; add to that the subsoil water, which, when the low level sewer now in progress was completed, would be greatly increased, and would amount to double the daily water supply. Look at the size of tank to hold the 100,000,000 gallons of water only, and then take that quantity for a week; because if they were to have tanks they must retain the water for some period of time. Then add to that the subsoil water and surface water from rain-falls, and they had a state of things that no human means could grapple with. They might do something with the sewage otherwise than tanking. There was no doubt in his own mind that the sewage of a populous town might be concentrated upon a comparatively small area of land. The sewage of Carlisle, with a population of 33,000, had been for several years successfully manipulated over 90 acres of land. At Croydon, he was happy to say, the authorities had got over the difficulties adverted to by Dr. Waller Lewis. An area of 300 acres had been secured, but only one-third of that area had yet been operated upon, over which the sewage was distributed, and the result was that the land so treated had been sublet at an increased rental of £1 per acre; but if they calculated the value of the sewage at the rate some persons put upon it, they would experience great disappointment, and such exaggerated values, instead of forwarding the question, only threw it back. Then again, if they took land to turn the sewage upon, they must have some means of qualifying the nuisance, when the supply of the sewage overpowered the means of distribution, by rendering it innocuous. That could be done by having open canals in which they could treat the moving sewage with lime, and diminish the velocity of the flow of it to about three inches per second. The lime would have the effect of precipitating the solid and flocculent matters, and the water might be passed into the stream without creating a nuisance or killing fish, but the water from that stream would not be such as he would supply for drinking purposes. With regard to the supply of water to the West-end of London, it was pumped from above Teddington lock, but the drainage of a popu-

lation of upwards of a million was discharged into the Thames above Teddington lock. The drainage of Windsor, Reading, and other towns polluted the water there. That question would probably be taken up some day, and the necessity of supplying the public with water free from the these pollutions, upon the Roman and eastern plan of aqueducts, would, he believed, be recognised. It would not deprive the river of water to a greater extent than was the case now, whilst the water would be supplied to the metropolis in a condition fit for human beings to drink. That was nothing more than the water companies might fairly be asked to do, and he was quite sure that the public would be willing to secure so great a desideratum by paying a reasonable percentage upon the expenditure incurred for that purpose. If the committee succeeded in ventilating this question they would not have met in vain.

Mr. HENRY WHITFELD said, having for thirty years taken great interest in sanitary matters and in the prevention as well as the cure of diseases, the results of his practical experience in that direction might not be without interest to the Committee. It had been a great object with him, as a medical man, in his own town of Ashford, to prevent the spread of infectious diseases by the speedy removal of persons affected from contact with the healthy. He had for many years endeavoured to get the local boards and parish authorities to take action in providing cottages to which patients might be removed upon the first breaking out of any contagious disease, such as small-pox or scarlatina. A communication on the subject had been made from his own parish to the Poor-Law Board, but although they were greatly disposed to favour such a plan, they had no power to act with regard to it. He had therefore taken up the matter personally, and had built and fitted up a small sanatorium at a little distance from Ashford, at a cost of £350. It was not originally intended for the use of the Union authorities, who to some extent were provided with the means of removing infected patients from the other inmates of the Union house, but he thought it highly important that each Union should be provided with two or three detached cottages at some distance from the general population of the parish, to which cases on the first break-out of any epidemic disorder could be speedily removed. Mr. Whitfeld mentioned several instances in which he said he believed the spread of diseases had been prevented by this system of speedy removal of the first patient from contact with the rest of the household. He added that, at the present time, there were upwards of 50 subscribers to his private sanatorium from which he derived a small per centage for his outlay. He felt sure it was the best, if not the only means of saving the population of a district from the spread of that fearful disease small-pox, which was now so prevalent in the metropolis. He thought it would be desirable to press upon the Poor Law Board the necessity of enforcing the provision of detached cottages for these purposes in every Union. The expense would be small, as he believed such cottages might be built for £100 each, with proper sanitary requirements. He was happy to find that his suggestion had been adopted in several Unions.

The Rev. W. ACWORTH, as a guardian of long standing, thought there could be no question as to the great desirability of the plan brought forward by the last speaker. The guardians of Leicester had provided a sanatorium of the character described, which, though not far from the workhouse, was sufficiently removed to prevent the spread of contagion from contact, and the same kind of provision had been made in several of the industrial and pauper schools of the metropolis, to which the first cases of the outbreak of any contagious disorder were immediately removed. He entirely concurred in the remarks that had fallen with regard to sanitary measures in connection with the water supply of towns. As far back as twelve years ago, he was struck with the extent of remittent fever that prevailed in his own district of Plumstead, and having made extensive inquiries into the matter, a bill was introduced into Parliament, by Lord Cranworth and Lord Palmerston, then Secretary of State for the Home Department, for the drainage of the whole of the marsh lands from the Nore up to London; but the progress of that measure was stopped by the introduction of the Local Management Act, which, it was stated by Lord Llanover, would entirely remove the evil complained of throughout the whole district of the bed of the Thames. The evidence of the most eminent medical men of the day, including the President of the College of Physicians, was given to show that in its then condition the valley of the Thames from Oxford down to the Nore was more or less subject to remittent fever and ague. A deputation upon the subject waited upon Sir George Grey last year, but unless the public mind were aroused, he feared nothing would be done to remedy this state of things. The Metropolitan Act did not extend to the parishes east of Plumstead, and the inhabitants of his parish were alarmed at the prospect of the introduction of so large a nuisance, from which it was apprehended that no one would be able to live there. There were other sanitary matters which it might be within the province of this Committee to touch upon, one of which was the habits of life of the lower classes, particularly the neglect of the principles of ventilation in their dwellings, and indulgence in alcoholic drinks, which interfered with the sanitary state of the people. It would be a desirable thing to make them understand the value of pure air and good water, even in such a parish as his own, with a population of 25,000. He should be happy to place at the disposal of the Committee a considerable amount of statistical information which he had gathered upon these matters during the last ten years, which was in itself sufficient to show the necessity for some steps being taken in this direction.

Mr. Alderman TOWLE said mention having been made of the city of Oxford, he would remark that if attention were directed to the state of things which was allowed to exist there, it might be of great benefit. It was astonishing the extent to which the waters of the Thames in that locality were permitted to be polluted by the discharge of the sewage of the town into them, in the face of the numerous plans that had been suggested for the remedy of that crying evil. The principal outlet of the sewage of Oxford had been carried to the corner of the Christchurch meadows, which was the scene of the fêtes and festivals of the city; and in seasons of drought and a diminished volume of water in the river, the accumulated mass of stagnant filth at that point was such as to occasion a fearful nuisance; and the only surprise was that in the present age of sanitary improvement such a state of things should be tolerated, more especially in the locality of one of the great Universities of the kingdom. In his own experience the application of the sewage to the land had produced the most remarkable results upon the crops, which he could show against all the country. He thought that the plan of storing the sewage in tanks was applicable to towns where the population was not excessive; but, at the same time, provision must be made for carrying off the storm waters, so as to keep the sewage as free from dilution as possible, and from the tanks the matter might be conveyed in an almost solid state and placed upon the land. He had nothing to suggest beyond bringing the subject before the Society and the public in a paper, and if no one else were prepared to bring it forward, he would willingly do so himself at a convenient time.

Dr. GILBERT agreed with almost every word that had fallen from Mr. Rawlinson, especially with regard to the great difficulty connected with the disposition of the sewage of large populations. There was no difficulty in settling what was the theoretical value of the excremental matters of a population; the difficulty was to know how to avail themselves of that value, whilst the sewage was necessarily diluted to the extent that had been spoken of. If there were no other reason for doubting whether in practice such a result could be obtained, if the excre-

mental matter were in a practicable form, the plan suggested by Mr. Rawlinson would be sufficient, viz., that the matter should be daily got rid of. It was probable that, during certain portions of the year, that matter would realise a considerable value for agricultural purposes, but at other times there would be difficulty in getting rid of it, even if it could be had for the mere carrying away; so that the theoretical value of the matter would not in any case be realised. It was a question he thought not yet determined whether the proper plan was to apply large quantities of sewage to limited areas of land, as the best means of utilising it. It was the opinion of many persons that the area of distribution should be considerably larger than was the case in the instances mentioned. If the distribution over the more extended area were adopted, he thought the cost of the operation would amount to a figure that had not been thought of. Supposing that during a portion of the year the sewage could be disposed of at its theoretical value, the question arose whether an engineer could distribute it, by means of pipes or other arrangement, at a price which would be anything like remunerative. His own opinion was that they could not, according to the present showing. If it could be shown that sewage might be distributed on the land at about a penny per ton, in a state of dilution like the London sewage, there were some hopes that it would be utilised in that way. The only suggestion he would throw out was whether the committee could obtain information as to the cost at which sewage could be pumped to a certain height and distributed over a given area.

Mr. Thomas Peake, being connected with an important part of the country, Staffordshire, and having for some years past taken a deep interest in sanitary matters, he would make a very few remarks—first with regard to prevention of diseases, and, secondly, as to making the best use of the sewage of towns and villages. Those whose observations were chiefly confined to the metropolis had no adequate idea of the difficulties which presented themselves in a mining district like Staffordshire. When the local bodies of such a district were asked to deal with sewage, he would in the first place ask—what was sewage? It could not mean the immense torrents of water that swept down over the Staffordshire hills, bringing large quantities of detritus. It was surprising how small a stream the sewage of 10,000 inhabitants amounted to. If the towns were well supplied with water it somewhat increased the quantity of fluid denominated sewage, but if, as was too often the case, they were short of that important and indispensable element, it reduced the stream to dimensions so small, that gentlemen connected with the metropolis would scarcely believe him if he named the diameter of tube that would carry off the sewage proper of a town of 20,000 inhabitants. In the mining districts water was pumped from the bowels of the earth largely surcharged with mineral products, which caused the destruction of fish, and led noblemen and landed proprietors to feel a decided objection to what was termed sewage. He submitted that the water which was pumped from the seams of the mines which were worked for the benefit of the country would not be placed in the category of sewage, and he believed, in dealing with the ultimate disposition of the sewage, three statute acres of land would absorb the sewage of 1,000 persons. He thought that was even more than would be required, and when the beneficial results of the application of the sewage to the land were manifested, there would be plenty of applications for it, to save the expense of putting other manure upon the land. It would be an advantage both to the owner and to the lessee. He could mention an instance in which land that 45 years ago was nothing more than a cover for snipes and birds of similar habits, was now let at £5 per acre, from having been subjected to a course of sewage irrigation. By these means they not only added to the fertility of the soil and increased the amount of food of the country, but they rendered the atmosphere of towns more healthy, and diminished the tendency to visitations of small-pox and cholera.

The Chairman then recapitulated the views of the several speakers, and remarked that he had no doubt the Council of the Society would be able to gather from them some points which would be worthy of their consideration. He was quite sure, looking at the cardinal objects of the Society of Arts, the Council would only be too happy if, in promoting sanitary improvements, a way might be found of benefiting the agricultural interest of the country at the same time, by the utilisation of the sewage matters in the manner that had been indicated by some of the speakers. The Council would feel indebted to those gentlemen who had favoured the Committee with their views, and he would suggest that upon any more definite ideas occurring to any members of the Committee they would be good enough to put them into writing and transmit them to the Secretary.

The Committee then separated.

EXTRA MEETING.

Wednesday, June 3, 1863.

An Extra Meeting was held on Wednesday, the 3rd inst., His Royal Highness the Duke of Cambridge, K.G., in the chair.

The following candidates were proposed for election as members of the Society:—

Doran, John, LL.D., F.S.A.	21, Royal-crescent, Notting-hill, W.
Galloway, Robert	22, Florence-terrace, New Cross-road, S.E.
Harradine, Thomas	7, Laurence Pountney-hill, E.C.
Phear, John Budd	7, Fig-tree-court, Temple, E.C.

The following candidates were balloted for and duly elected members of the Society:—

Angell, Lewis	8, Middleton-terrace, Merton-road, Wandsworth, S.W.
Craig, John	20, Parade, Harleyford-road, Vauxhall, S.
Downes, Thomas Ring	1, Park-cottages, Adelaide-road, Haverstock-hill, N.W.
Elderton, Edward M.	28, St. George's-square, S.W.
Elliott, John	2, Finsbury-pavement, E.C.
Farthing, J. Johnson	36, Great George-street, S.W.
Waine, William	Newington-butts, S.
Walker, Thomas	Speedwell House, Birmingham.

And as Honorary Corresponding Member,

Newbery, Joseph Vickers. | Shanghai, China.

The Paper read was—

ON THE RESULTS OF THE INTERNATIONAL EXHIBITION OF 1862.

By William Hawes.

I have already had the honour of reading two papers before the Society on the Exhibition of 1862,—one in 1861, when our lamented President the Prince Consort presided, the object of which was to show there were sound reasons for believing that the then contemplated Exhibition would fully realise the most sanguine anticipations of its success—and a second, in 1862, soon after the Exhibition had opened, when the Earl Granville, Chairman of the Commission, presided, in which I directed the attention of the Society to the evidence it afforded of our industrial progress in the preceding ten years.

I now venture to read a third paper, in which I shall endeavour to point out the results it has produced, and which it will probably produce, as well on future Exhibitions as upon the future progress of industry and art.

In the paper I read last year, I dwelt at length upon the lasting impression I believed the study of the varied and very beautiful contents of the Exhibition would make on the public mind, and expressed a strong opinion that our industrial progress, for years to come, would be most beneficially promoted by it. All who hear me will, I think, agree in the correctness of this opinion. The more practical and really useful character of the manufactures exhibited, and the great beauty of the works of art, place this Exhibition far above those of 1851 and 1855 in national importance.

Assuming that the Exhibition of 1851 gave us a true representation of the industry of the world at that time, we are now able to point in an unmistakeable manner to a rapidity of progress in ten years, of which the most sanguine advocate of International Exhibitions in 1851 would not have dreamed, and which could not have been accurately measured but for that Exhibition. This advance beyond the mark set in 1851 has not been confined to one country or to one people, but, though in different degrees, has been achieved, with one lamentable exception, by every country and people who then exhibited.

It may be said, however, this progress is not all to be ascribed to the Exhibition of 1851. No doubt that is so; but few will be found to assert that the direction it gave to industry, and to the interchange of knowledge and ideas between the artists and manufacturers of so many nations, did not powerfully stimulate the development of that great activity in commerce, in manufactures, in design, and in art, which has so decidedly marked the last ten years.

To one country it showed its industrial weakness, to another that it was dangerous to rely too much on its strength, and to all it read lessons of humility and of hope.

If, then, the interchange of opinions, the inspection of rival productions by thousands of people in 1851, who otherwise could not have seen them, did to any extent (and I believe it did to a great extent) assist in developing this increased perfection in every branch of art and industry which we have all witnessed, and which was so striking to those who, having carefully inspected the Exhibition of 1851, could compare it with that of 1862, what will be the effect, in the next ten years, upon the larger number of manufacturers and workmen who have studied with increased interest, knowledge, and skill, the very superior productions of domestic and foreign industry exhibited last year?

Have we not a fair right to assume that, as the field is wider, as the intelligence, skill, and capital brought to bear upon the industry of the world has increased beyond all former precedent, especially in India and in our colonies, so the result of another decade of the world's labour will show an advance as great and as remarkable —if not greater and more remarkable—in its practical character, beyond 1862, as 1862 has shown beyond that of 1851?

This, then, is one of the results which cannot fail to flow from the very much higher standard of excellence in every department of the Exhibition just submitted by the world's best workmen for public inspection and to public competition; and can anything show the confidence of superior skill and intelligence over inferior workmanship and ignorance, its freedom from jealousy and its liberality in a higher degree, than these periodical displays by all civilised communities of every industrial improvement, to the gaze of the world and to the examination of rivals, come from where they may? All intelligent workmen have learned that they gain more by zealously assisting to form such collections, and then studying them as a whole, than they could by years of patient toil, shut out from the stimulating effect of unlimited competition, and the advantages of unrestricted communication with the best and foremost men of the age.

If, then, these Exhibitions, originated just as the principles of free-trade were approved by this country, but also at a time when they were only to a small extent acknowledged, and to a still smaller extent practically adopted by the governments of foreign countries, have in one decade produced such wonderful results, what may we not expect when all the restrictions which now impede the freest intercourse, commercial, industrial, and artistical, between nations are removed?

That this result must follow from the vast amount of practical knowledge which the wisest and most influential minds, having great influence in the direction of the affairs of foreign countries, have received from the inspection of the collections of 1851, 1855 and 1862, appears to me to be the necessary sequence of events, and when that time arrives the world will proudly acknowledge the wisdom and foresight of that truly great and catholic mind which inaugurated these most benevolent, most liberal, most Christian institutions, which have so much hastened this desirable consummation; and proud will our countrymen then be of the great Prince to whom his adopted country will owe so much, but to whom the world will owe more, for the practical direction he gave at the right moment to a great and novel conception, and for the perseverance and ability with which he worked it out.

It seldom falls to the lot of one man, and still more rarely to that of a Prince, to originate a great idea—to take the foremost place in maturing it—to live to see its success in the highest degree, as well at home as abroad, and thereby to lay the foundation for industrial triumphs in generations to come.

But let us now turn to the results of the late Exhibition which can be now appreciated. The first to which I will refer are those produced upon foreigners.

The number of foreign exhibitors in 1851, was 6,566, and in 1862, 16,456, an increase of more than 150 per cent. The number of letters which passed between England and France in 1851, was 2,495,375, and in 1862, 6,175,191, an increase in eleven years of 148 per cent., and the increased number of foreigners who visited London, but of which there is no official record, may be estimated by the numbers who visited the Dockyard and Arsenal at Woolwich, which were 437 only in 1851, and 9,295 in 1862.

The number who visited and studied the works exhibited was, I believe, in a greater proportion still, and there is no doubt that the hospitable and liberal reception they met with from all classes produced feelings of cordiality, confidence, and respect, nationally of the greatest importance, and most gratifying to all who took an active part in the work of the Exhibition.

I believe the feeling of foreign exhibitors towards us in 1862 was of a very different character to that which existed in 1851, when national jealousy, which most effectually retards progress, was uppermost in their minds, but which is now, we have much reason to believe, displaced by a wholesome and friendly spirit of emulation and active competition, that must ere long enable, not only those who visited these international institutions, but nations at large, properly to appreciate the true character of each other.

In illustration of this view I cannot do better than quote the words of M. Michel Chevalier, President of the French Section of the International Jury, in his report on the Exhibition, addressed to Prince Napoleon, the President of the Imperial Commission. He says—"The character of the personal relations which have existed between the English and the French, at the Exposition of 1862, suggest a reflection and a hope. It is impossible that two people who voluntarily exhibit so much reciprocal regard—who have so many ideas and so many interests in common, can be permanently otherwise than allied in close friendship. This will not be for their benefit only but for that of all mankind." One of the writers in the "Annales du Conservatoire Impérial," M. Payen, says—"I declare it would have been impossible

"for me to discharge my duty as a Juror but for the extreme kindness of both French and English manufacturers. The graceful and most hospitable reception I experienced in England made my minute and comparative examination easy, interesting, agreeable, and very instructive."

But although the cultivation of such feelings by reciprocal acts of courtesy is of the greatest value in promoting the growth of a sincere and lasting friendship between the people of all nations, the influence it exerts in breaking through the unreasoning attachment to prohibitive duties and a protective commercial policy, which exists in the minds of the great bulk of foreigners, as it did in ours but a few years back, is slight, compared with that permanent impression produced upon them by their inspection of the rapid advance our manufacturers have made since they have met the unrestricted competition of all the world.

Many of the foreigners who visited this Exhibition recollected the trouble and annoyance occasioned by our customs laws and regulations in 1851. In 1862 they found them all but abolished. They knew the effect that similar laws produce in their respective countries, and the able body of foreign commissioners and manufacturers who attended this Exhibition, officially and otherwise, cannot be insensible to the fact, that in spite of free competition with all the world, we have made great progress in our old industries, and equally great, if not greater progress, in manufactures indigenous almost to foreign countries, and the superiority of which over ours in 1851 was most decided. To their suprise they found that improvement had been most rapid, in every important quality of excellence in the manufacture of silk, in the artistic decoration of china, and in the quality and workmanship of glass.

The conclusion to which the examination of the state of the manufacturing industry of the world in 1862, as compared with that in 1851, must lead them, appears to me to be irresistible, and will gradually force them, first to believe in and then to urge upon their respective governments the adoption of those sound principles by the application of which they see we have gained so much. Nothing but the actual inspection not of one, but of the great variety of articles exhibited, all telling the same tale, could effect such a change of opinion as is now in progress abroad.

Prohibitory and restrictive commercial laws have, it is believed, received a mortal blow in Europe. By the Exhibitions of 1851, 1855, and 1862, governments as well as people have been liberalised and enlightened, have yielded up national prejudices to the force of reason and experience, and now take broader and sounder views of the advantages, social and political, produced by unrestricted commerce.

I cannot dwell longer on the beneficial results produced on the minds of foreigners by the examination of this Exhibition and the cordial manner in which they were received; but, satisfied as we must be, with their all but universal admission of our remarkable progress, and their tribute of praise to our system of legislation which has so much promoted it, we must not forget that that admission by them becomes the most powerful stimulus to exertion, and obliges us, if we are to maintain our position in the industries of the world, not to relax our endeavours to advance in the coming ten years fully as much as in the past; or our neighbours and rivals will assuredly reach our standard, and probably pass it, in the race for superiority.

Here, then, is the second result of the greatest value to us nationally, arising directly from the Exhibition. Admit International Exhibitions to be institutions of world-wide utility; admit them as a necessary part of the commercial machinery of the world, and their recurrence at given periods is certain—becomes, indeed, a necessity; and you thereby oblige every artist, every producer, every manufacturer to exert himself to the utmost to maintain his national reputation and his own position, securing thereby to the world at large the best, the cheapest, the most useful, as well as the most beautiful applications of human industry to the production of every article, required alike for the necessities and for the luxuries of life. You increase the range of human wants, and, at the same time, by the united and almost unconscious exertions of all, provide the means by which they can be most economically supplied. You elevate the taste, and enlarge the sphere of enjoyment to the great mass of mankind.

It has, however, been objected, that by stimulating foreign industry we increase the difficulties of our workmen.

It is notorious that a large number of exhibitors whose success last year has been fully admitted, and most of whom have, I believe, derived great benefit from it, would, two years since, have rather discouraged than encouraged the then proposed Exhibition.

They were contented to rest upon their well-earned laurels, and perhaps feared competition with younger and more active spirits, whether English or Foreign. But I have not heard of an instance in which old firms, who were, we may truly say, obliged, and many unwillingly, to enter the lists, have been found wanting. Every appliance younger competitors can adopt to secure success must be more easily available to their older rivals. Great changes in taste and design are rarely effected by an individual effort, they are introduced gradually, and it must be the fault of every old and hitherto successful exhibitor if he allow others to pass him in the race for public support.

Indeed, I fear the tendency of Exhibitions is rather to increase the difficulties of young and new exhibiting firms and individuals than to injure old ones. Everything exhibited by well-known names first attracts attention, and if their reputation be maintained, they will not be harmed in the encounter with the world; indeed, I believe that, on the contrary, the stimulus which the necessity for exertion imposes upon them, ensures on their part corresponding endeavours to excel, which amply repay them in the long run for the time and labour expended in the struggle, and ultimately make them the most earnest supporters of International Exhibitions. This, then, is the benefit we derive at home from Exhibitions. Everyone is stimulated to exertion, to invention and to improvement, by the pressure of a power before unknown. Apart from our competition with foreigners, which cannot but be useful, a wholesome rivalry is created among ourselves, and so long as that exists in full force, we need not fear that any foreigner will excel us in those branches of industry which our soil, our natural and mineral products, our climate, our capital, as well as our perseverance and untiring industry make peculiarly our own.

If we have an industry the offspring of vicious legislation, founded on prohibitive duties, it must, and ought to, fail in the world's competition. The sooner every country discovers what it can produce best and cheapest, and then exerts itself to supply such commodities to all the world in exchange for others it cannot produce so advantageously or so cheaply, the greater will be the prosperity of all, and then perfectly free trade, and the freest interchange of scientific and practical knowledge, will become the test of progress and civilisation, and every economy in production and manufacture, wherever and by whomsoever discovered, will benefit every country alike.

Let us next endeavour to trace the practical result which may be fairly said to have followed the inspection of the articles exhibited.

First, as to Painting and Sculpture. The incompleteness of an Exhibition without a collection of pictures was so universally felt in 1851, that nearly the first condition made by the Council of our Society, when negotiating with the Commissioners of 1851, was that a collection of modern paintings should form a prominent feature in the proposed Exhibition of 1862.

As soon as this point was decided, the erection of proper

galleries, to secure the safety and proper display of the most valuable collection of works of modern art ever brought together, followed as a matter of course, and thus certain conditions were imposed upon the Commissioners in their selection of plans for the building, which necessarily gave it an entirely different character from that of 1851.

Picture galleries of the dimensions required, so lighted as to do justice alike to paintings in oil and water colours, so ventilated as to secure the pictures from injury arising from great changes of temperature and in the conditions of the atmosphere, had never been erected in this country, and the successful manner in which these difficulties were met, and so many pictures of every possible variety of subject and treatment so well exhibited, and then returned to their owners uninjured, reflected the greatest credit on the architect of the galleries, and upon those who arranged the pictures, Mr. R. Redgrave, R.A., and Mr. Creswick, R.A.

It was, I believe, admitted by the artists of all countries that these galleries afforded them better opportunities of studying the various schools of modern art, and of comparing school with school, than they had ever before enjoyed.

From the gallery we will turn to the pictures:—

So magnificent a collection of the works of our English masters, living at the commencement of the period within which pictures were admitted, has never before been brought together. The works of Hogarth, Wilson, Reynolds, and Gainsborough, were all, or very nearly so, of the finest quality; but I venture, with great diffidence, to express an opinion that the same full and ample justice was not done to the reputations of the very distinguished artists who lived in the next period—Lawrence, Callcott, Wilkie, Constable, and Leslie—many of whose finest works were not to be found in this collection.

With regard to the pictures of artists now living, I think, to some exent, the same remark is applicable, but considering the English collection as a whole, we must admit —though many of the finest pictures, painted within the last fifty years, were not exhibited—that it was a collection well calculated to maintain the reputation of the English school in the estimation of foreigners.

I feel great difficulty in hazarding an opinion as to how far the pictures by foreign artists adequately represented the present state of art in their respective countries.

The Austrian Commissioners state emphatically, in their official catalogue, that the space allotted in the galleries to Austria was far too limited to admit of an adequate representation of the progress and present state of the artists.

This is the more to be regretted, as, in the words of the official report, "it prevented that complete comparison "between British and Austrian art which would have "excited much interest among the English public on "account of the analogies between the tendencies of "modern German art and those of English art."

The remarks upon the recent progress of the fine arts in Austria are also interesting, for, whether tested by the progress of painting, sculpture, or architecture, we are told that, "whoever views with impartial eyes the intel- "lectual movement and the artistical activity now alive in "Austria, must come to the conviction that the movement "is intense and follows an ascending direction;" and the report concludes by hoping that the "new era of civil "and religious liberty inaugurated by the spontaneous "will of the Emperor may promote the increase and pro- "gress of the peaceful art assembled in the London "Exhibition as in a temple of peace."

The French pictures, though sufficient, I believe, to convey an accurate knowledge of the present state of that school, were limited, as ours were in the French Exhibition in 1855, to works executed within the previous ten years, and therefore did not show the progressive advance of painting in France; but their excellence was very generally, though I think not so universally, admitted as this fine collection of pictures deserved. In colour, taste, and feeling many of them were unsurpassed, and it is much to be regretted—though it was unavoidable—that the examples were limited to the most recent productions of French artists.

M. Chevalier, in his report, to which I have before referred, states that—"The French Commission did not "adopt the limitation fixed by the English Commissioners, "because, independently of the impossibility of having "space sufficient for the exhibition of the works of French "artists of the last century, all their principal works are open "for public inspection in their public galleries, and are well- "known to artists and the public, whereas those of more "recent date are little known, being dispersed all over the "country, in various private collections; and that, there- "fore, as there could not be room for all, it was better to ex- "clude older and known works than those of living artists."

No doubt it is very difficult for us to form a perfectly impartial opinion upon the real or comparative merits of foreign pictures, as compared with our own, the subjects and the mode of treating them, being so different from those we are accustomed to admire. The English unprofessional eye, trained for the most part by the study of a limited number of examples of ancient art and of our own school, can hardly be expected at once to estimate correctly the merits of the composition, the drawing, or the colouring of French artists, whose pictures—more imaginative, more accurate in drawing and composition, but less vigorous in colour and expression than our own, require continuous as well as careful study to be thoroughly appreciated, and the want of which I think has led us rather to underrate the position they are entitled to hold in the world of art.

Upon the comparative merits or the special beauties of the pictures exhibited by the Belgian (which were second only to the French), Dutch, Italian, Danish, and other foreign schools, I have not time to dwell, but judging from the pleasure afforded to the large number of persons who inspected and admired them, it is impossible not to arrive at the conclusion that public taste must be refined, and the appreciation of art enlarged, by the knowledge we have thus obtained of the beautiful works produced by foreign artists; nor is it, I hope, too much to expect that our younger artists may by their study see the importance of avoiding that mannerism which is too apt to characterise every school, and by taking high and comprehensive views of the objects of their art, not condescending to paint down to the tastes of the uneducated, or to produce a sensation at the expense of honesty and decorum, may help to elevate the moral tone of the country, to prompt to what is good, noble, and generous, to raise our national school to a higher point of excellence than it has hitherto attained, and thereby to mark the Exhibition of 1862 as a starting point in the history and progress of our English school of art.

The limits to which I am confined oblige me to be very brief in my observations on the sister art; but having referred to painting, I may not omit to notice the sculpture contributed to the Exhibition. If supply may be taken as a fair test of demand, sculptors have no cause of complaint. The number of works exhibited amounted to many hundreds, of which by far the greater proportion were by British artists. Taking into account only the best works contributed by all schools, foreign and native, it is gratifying to feel that England had no cause to be ashamed of the sculpture she could produce. At the same time it is to be regretted, that owing to the very large number of works admitted, seemingly without selection or discrimination, our cause was injured by the quantity of mediocre productions that were forced into notice, and overwhelmed the better works of which our school showed itself capable.

France exhibited great power in mastery of form, in drawing or knowledge of the figure, and in *bravura* of subject and execution. No works of any country were superior to these in artistic qualities. The character of subject fell short of the execution. It usually appealed

rather to the senses than to the higher feelings and sentiments—a most dangerous tendency, in this art especially.

The sculptors of Italy, of the German and cognate schools, and of America, showed there was everywhere great increase of power in their practice of this art.

But all sculpture, to be good, must be founded on certain fixed principles, approved and established by the verdict of ages; and, therefore, though the choice and character of subjects may indicate individual tendencies, the material representation of these should be limited by the application of approved formulas, such as beautiful form and a grand style of treatment, of which the best examples are found in the highest class of Greek sculpture. This, while it prevents that national classification of schools which may be made in painting, will always, to a certain extent, keep sculpture exotic; for, though no one can desire to see obsolete classical subjects and figures constantly repeated by modern artists, sculpture cannot easily nor be safely adapted to ordinary every-day subjects, and to modern and peculiar national habits.

This temptation to use an art most limited as to means, namely, Form only, to address the same class of feelings and sympathies as can only be awakened by painting, with all its appliances of colour and effects, is a constant endeavour with a certain class of sculptors who cannot, or will not, recognise the simple conditions on which alone this art can be safely practised. The consequence has been that while, on one hand, some sculptors have only re-copied Greek ideas and Greek modes, till in their tame repetitions the art has had no life or meaning to modern intelligences, on the other, in order to gain popularity, the art has been lowered either to what is meretricious and sensual, or common-place and familiar, or to the trifling and, so to say, clap-trap.

It was generally felt by thoughtful and competent critics that the appeal of some of the best works in sculpture was to the lower sensibilities—to the eye and the mere sense rather than to the heart and mind; that the nobler objects to which a severe and chaste art should be devoted, namely, to teach and to elevate by means of beautiful forms, were too often sacrificed either to mere school art, that is, the academical display of the figure, male or female, or to clever but mechanical execution, or to such subjects and such technical treatment and accessories as should catch the lower class of popular applause. Thus many such productions, certain to please uncultivated persons, occupied attention while better works were neglected; and the unworthy and tricky artifices, which gave to performances the character of toys and fancy work rather than true sculpture, were run after, while more chaste works, that were capable of improving the public taste, were passed by unnoticed and unappreciated. Still, it is a subject of congratulation that there were many productions of this higher class to encourage our hope of the future success of sculpture, and in lamenting the want of more general appreciation of these, we must bear in mind how little care has been hitherto bestowed in educating the public, high and low, in the value of art, or in teaching them how to judge it.

I conclusion I would venture to say, that the executive power shown in this art proves that it is not the hand that fails to procure a high position for modern sculpture; and we may, therefore, indulge the hope that, with this important element of success secured, the higher objects of the art may in time be nobly carried out. Nothing but the best results, to this highest branch of fine art, can arise from the opportunities this collection afforded for the study of the best works of sculptors of so many nations.

Passing from fine art to the consideration of the effect which the increased appreciation of art in this country has produced on design applied to our manufactures, it was universally admitted that the improvement of our taste and workmanship had been most remarkable in the last ten years, and that the effect of the study of the forms and colours of foreign models in 1851, improved upon by the more intimate acquaintance with foreign manufactures which our recent commercial policy has encouraged, was apparent in every branch of industry, from the designs for the commonest crockery, or the most useful articles of ordinary furniture, to those of the most costly china or articles of *vertu;* a beautiful form is now found to be as economical in production, and more saleable than an ugly one. The pleasure it affords is constant, and every new elegance of form applied to articles used in every-day life, tends to ripen, by imperceptible degrees, the general taste of the country; and should the rapid progress of the last ten years continue, it will soon be as rare to see an ugly form as a few years back it was to find one with any pretension to beauty or taste.

I will next briefly review the Jury Reports, and endeavour to show from them the extent of industrial progress since 1851, and to indicate, where it is possible, to what extent this progress has been stimulated by that Exhibition. I cannot do better than introduce this part of my subject by again quoting from the official report of M. Chevalier, who records his opinion that "the Exposition "of 1862 was a great success," and that "in most branches "of industry better things are now produced at less cost, "and that man has acquired a new degree of productive "power." He illustrates these remarks by referring to the rapidly-increased application of steam-power to agriculture—to the increased perfection of mechanical tools—and to the almost magical changes now produced by chemistry; and expresses with warmth the great satisfaction "there is in making a voyage round the world without "leaving an apartment decorated with objects of art—with "*chefs-d'œuvre* of industry—with tropical plants, and re-"freshed by fountains."

In Classes 1, 31 and 32, Metallurgy, Hardware, Iron and Steel, it was generally acknowledged that the information gained in 1851 materially contributed to the great perfection these industries have now attained.

The recollection of the deficiency in these classes in 1851 produced the best results upon the collections of minerals, of metallurgical and geological specimens just exhibited, and the importance of affording to the public the fullest information relating to the wealth of mineral properties at home, abroad, and in the colonies, induced foreign governments, our Indian government, and many owners of such properties to exhibit such magnificent geological and mineralogical maps, and to prepare specimens so ample, and collections so complete and well arranged, as to afford opportunities for study that have never before existed; but one remarkable fact connected with many of the most important of these collections is, that they were exhibited by companies and individuals who can derive no pecuniary gain from their Exhibition, and who incurred the labour and expense for the honour of their craft, and with the worthy ambition of contributing their part to the friendly concourse in which all the world was invited to join.

In Class 1 the number of exhibitors was double that of 1851. Great progress was shown in the production and manipulation of the rarer metals. Platinum, which, till lately, was only fusible in small quantities, has now been fused and worked in a mass of above 3,000 pounds weight. Aluminium, recently produced only in the laboratory, and sold by the ounce, is now manufactured and sold by the pound. Iridium, almost unknown, commercially speaking, in 1851, was shown in considerable quantities, and perhaps the best tribute to the excellence of the specimens exhibited in this class is to be found in a paper in the last number of *Silliman's Journal*, by Mr. O. C. Marsh, who says that this class offered a "fuller and "more instructive collection of objects than had ever before "been brought together," and that "the specimens of "platinum and its associated metals were among the most "interesting objects in the Exhibition."

In Classes 31 and 32, Iron and Steel, the Jury reports great progress, and that steel was shown in masses and applied to purposes equally unknown ten years since; and

Mr. Marsh, in the paper in *Siliman's Journal*, to which I have already alluded, says, "that the collection of iron "ores, and the manufactures from them of iron and steel, "were far superior, in many respects, to anything before "made, showing however greater facilities for production "and application, than new scientific information." He directs special attention to the products of the forges of Bessemer and Krupp. To these classes M. Chevalier also pays particular attention. He carefully compares the state of this manufacture in France with that in this country and in Prussia, examines most attentively the steel produced by Bessemer and Krupp, and gives a most interesting account of the general development of the trade.

The Jury report in reference to the improvements in the manufacture of steel and iron, that although in the past ten years—1851 to 1862—177 applications have been made for patents, and 127 patents have been actually granted, only one has produced any striking change, or been attended with really practical and commercial results.

Class 2, Chemistry. The reporter considers that the progress during the past decade has been as great, if not greater than in any other of the classes in the Exhibition.

"He states that manufacturers English, and Foreign, "have in many instances exhibited their processes of manu- "facture with a liberal disregard of trade secrets, with an "ardour to disseminate useful knowledge worthy of these "noble occasions, and that the English contributors have "in 1862 out done their admitted superiority in 1851."

It is impossible to do more than notice the elaborate treatises on the chemical manufactures of Great Britain and Europe, which will render this report of great value to the scientific chemist and to the practical manufacturer. They will mark clearly the exact state of each process in 1862.

The references in the notes evince the anxious desire of Dr. Hofmann to afford to the public every possible means of obtaining, if they desire it, fuller information on every subject on which he treats than he is able to insert in the report.

To show the admirable spirit in which this report is written, I will quote the following passage from the introductory observations:—

"During a survey of the Exhibition of 1862, the visitor "cannot fail to be struck by the astonishing rapidity with "which industry, in this country more particularly, "assimilates the discoveries of science, gathering, so to "speak, the ripe fruit of practical result from the seedling "of theory only just sprung into existence; seizing upon "new laws ere yet fairly ripe for enunciation, and boldly "founding great manufactures upon laboratory researches "themselves incomplete. So closely indeed does practice "now tread upon the heels of theory, that the philosophi- "cal chemist is often quite astonished to find as the result "of his purely scientific researches industrial improve- "ments he did not foresee and often cannot fully explain."

In Class 5—Railway Plant and Locomotives—the Jury report that there were but few absolutely new machines, but that there was a marked improvement in all the details of construction; and with respect to manufacturing machines and tools, and Class 7, machinery in general, the report says that although there was but little real novelty, yet throughout this large branch of trade, including the manufacture of machines for working up cotton, wool, and silk, there was greater simplicity, greater capability for production, with increased cheapness and superiority of workmanship over 1851.

In Class 10 the great engineering works designed and completed in the last 12 years, are noticed, and their superiority over similar works of an earlier date, owing to the increased application of iron in their construction, as well as by its use as a means of construction, is dwelt upon.

Class 12, Naval Architecture. The Jury report dwells at much length on the changes effected since 1851. Then there were only a few steam frigates and but one steam line-of-battle ship; the increased use of iron instead of wood in their construction, and the new ordnance exhibited in Class 11 have together given a new character to the industry employed in naval architecture.

I think the impression produced on Englishmen by the examination of these classes must have been that of great security—and on foreigners, that of our power to protect and preserve that security inviolate.

Class 13, Philosophical Instruments, Electric Telegraphy, &c., the reporter informs us in this very elaborate report that whereas in 1851 the electrical instruments exhibited were few in number, in 1862 they were numerous and excellent; and that whereas in 1851 telegraphic apparatus was exhibited by but two foreign exhibitors, a fair proportion of all exhibited in 1862 came from abroad.

No great discovery in electric science is reported in the past ten years, or any new applications of its principles; indeed, many sanguine expectations then entertained remain unfulfilled. There has, however, been a great extension of the system of electric telegraphy since 1851.

In Great Britain there are now above 50,000 miles of wires against 10,000 in 1851.

In Europe there are more than 100,000 miles now in use; in America, 50,000; and in Australia, in the colony of Victoria, 1,300.

The improvements in telegraphic apparatus are important as regards workmanship, in increased simplicity of construction, and in the delicacy and susceptibility of the parts, to protect which 465 patents have been obtained since 1851.

The tendency as the discoveries in this branch of science proceeded was to attribute to electric forces greater power than they possessed, and various pretty toys were invented to illustrate it. But these have all given way before the influence of the discovery of the definite measurable correlation, or equivalence, of various physical forces.

In this class, then, as in most others, great progress is manifested without new invention, and the reporter has taken great pains to point out the amount and direction of that progress since 1851, and so clearly and accurately to record the position of electric telegraphy in 1862, that at a future time we shall be able to ascertain exactly the extent and value of whatever improvements may have been introduced.

The reporter on Philosophical Instruments, whilst regretting the absence of several of our most distinguished makers, admits great excellence on the part of those who do exhibit, and gives to Mr. Buckingham the credit of exhibiting the largest achromatic object glass in existence, 20 in. in diameter. The report states that the display offers no index to the existing state of this art, and refers in evidence of this statement to the important instruments recently supplied to our Royal Observatory, and to those of Oxford, Cambridge, Edinburgh, the Cape of Good Hope, and Paris, as well as to our distinguished observers, Mr. Lassell, Mr. Nasmyth, and Mr. De la Rue.

The reporter calls attention to the inability of the jury to test the real value of the instruments exhibited, and states that the awards only mark an approval of the design and execution of the mechanical part of the instrument, and have no reference to the more important qualities for which the instrument was constructed, and which no doubt accounts for our best makers not exhibiting. The binocular microscope is the great novelty in this class, and has created a new era in the history of the microscope.

Class 14, Photography, is a new class since 1851. In that year the few pictures exhibited were hung among the philosophical instruments, and even so recently as 1855 they were placed with printing and paper-hangings. Now, though still in its infancy, it has risen to an important branch of art and industry, promising wider development and more important results. Since 1852, 200 patents have been issued relative to the apparatus used in this class.

The reports on Classes 18, Cotton; 20, Silk; 21, Woollen Goods; 22, Carpets; and 23, Woven, Spun, and Felted Fabrics, are most instructive.

On cotton the Jury report: "Great improvement is observable in this manufacture as compared with the former exhibition." The use of improved machinery in Europe has equalised the products of nations. The new French combing machine, an invention of surpassing ingenuity, has rendered a degree of excellence attainable in the finer numbers of yarns which was previously almost impossible. English cotton velvets, scarcely shown in 1851, are now made of great excellence and beauty.

The muslins of "Tarare," manufactured by M. Thive Michon, and said to be the finest in the world, leave nothing to be desired, and are produced by the combination of the highest numbers of French and English yarns.

Switzerland in its finest muslins competes in quality and cheapness with those of Tarare, and specially excels in the cheapness of the cotton goods made by hand. Austria and the Zollverein, each send goods of high quality, and each has a speciality—Austria its chenille shawls—the Zollverein its thick coloured cotton cloth.

On Class 20, Silk, the Jury report that notwithstanding a great variety of discouraging elements, our progress has been remarkable in design, colour, and texture, and this applies as well to moiré antiques and fancy goods as to ribbons, in the manufacture of which the Coventry manufacturers have made rapid progress.

The French fully maintain their acknowledged excellence, though the difference between them and the manufacturers of England and the Zollverein is less obvious than it was in 1851.

In Classes 21 and 23, Woollen Goods, the report records most rapid progress and development since 1851—all ordinary rates of improvement it says have been far surpassed, and the magnitude of the results exceeds the most sanguine anticipations.

So remarkable is the improvement that has taken place in the manufacture of harness and Jacquard loom woven shawls, that this has become truly high art weaving, and our Scotch manufactures, one and all, show a marked advance, which, if continued, will enable us to rival Paris productions.

The greatly-increased supply of wool, improved machinery, superior skill in dyeing, and more beautiful dyes, have all contributed to produce more beautiful fabrics and to cheapen their price, and much of this improvement the reporter attributes to the information which the Exhibition of 1851 diffused among manufacturers.

The progress appears to have been most decided in Austria, where, instead of being content to imitate the manufactures of England and France, they have displayed most creditable originality; and the Jury report that the Austrian goods exhibited are the ordinary productions of the various districts from which they came, and were not prepared with a view of unfairly inviting commercial operations.

Belgium appears to have studied the production of goods of the cheapest class, and is now a most formidable rival to our Yorkshire manufacturers. She does not maintain her old reputation for fine quality.

France, in the words of the report, has sent goods "which are models for others, as nothing can excel their superior quality and generally excellent finish."

Spain, in 1851, showed nothing worthy of notice in woollen goods, but has now obtained several medals and honourable mentions.

The Zollverein is not perfectly represented in this branch of trade, and stands low in the award of prizes, of which France obtained the largest per-centage, in proportion to the exhibitors, England the next, then Sweden, Spain, Austria, and the Zollverein.

In Class 28 (Paper) the Jury express regret that only eleven English paper-makers were exhibitors, the number being the same as in 1851, whilst the increase of foreign exhibitors was very considerable, France supplying 17, Prussia 20, and Italy 10, out of a total of 95.

The Jury report that the general market value of the British specimens in 1851 was much higher than that of 1862, whilst the foreign makers present to our notice a much larger proportion of high-class papers made from rags than they then did.

Great attention was directed for a time to the discovery of a new material for the manufacture of paper as a substitute for rags, but, notwithstanding the offer of the large prize of £1,000, by the proprietors of the *Times* for a good paper made from any material except rags, and the general stimulus which was given to invention by the contemplated scarcity of rags, no important discovery has been made, and that, notwithstanding large quantities of paper are made in England and abroad, from straw, esparto, and other fibres, all first-class printing and writing papers are still made from rags. Very beautiful specimens, made from maize fibre, were exhibited in the Austrian department. The reporter adds that, although since the passing of the Patent Law Amendment Act in 1852 to the close of 1857, 147 patents were obtained for improvements relating to paper, he is not aware, with the exception of those relating to straw and esparto, that any of the above patents have come into profitable use. Since 1857, 229 patents have been taken out, with I fear very similar results.

Class 29, Education, a class of much importance, which was not recognised in 1851—thus specially marking the increased attention now devoted to everything calculated to raise the mental and moral condition of the people. Great interest was manifested in the examination of the educational appliances of our colonies and of foreign countries, and in comparing them with our own.

The reporter for this class carefully compares the statistics of instruction in Austria, France, Prussia, Holland, Upper and Lower Canada, and the colony of Victoria, but regrets that he is unable, for want of information, to furnish, respecting the state of instruction in Great Britain, any figures approaching in completeness to those given for other countries.

In Class 30, Furniture, the report tells us of a great advance in workmanship, tending particularly to economy of production, but not in originality of design or ornamentation.

I cannot devote more time to the examination of these reports; on the whole they are carefully drawn, and so minute in their details, that future progress in each class will be easily measured; but it is very much to be regretted that the reporters did not more minutely compare the present state of each industry with its position in 1851, and record the progress, whether in new inventions, manipulative skill, improved taste in design, or increased cheapness, made in each class in the eleven years.

I fear that by this omission one of the most important of the objects of International Exhibitions, and on which the Prince Consort laid the greatest stress, has been lost sight of, and a great means of usefulness neglected.

The Colonial and Indian departments next require very special notice. In 1851, but 19 colonies were represented —in 1862, 31, exclusive of India. The collections of natural products—animal, vegetable, and mineral—from India, our colonies, and those of France and Holland, were of the greatest interest, and could not, except at an International Exhibition, have been so perfectly brought under the notice of the naturalist, the statesman, and the man of business.

They marked, especially by the scientific and practical knowledge displayed in the selection and arrangement of these magnificent collections, the progress of communities who carried with them to distant climes the habits and wants of their mother country, returning to her food and raw materials of the finest quality, and in unlimited quantity, nearly all gained from lands which but a few years since were unproductive.

It is, then, in the intimate acquaintance which these recurring exhibitions afford of the value and abundance of the products of the distant possessions of European Go-

vernments, that we may discern one of the greatest benefits which they confer on our industrious classes.

The competition and rivalry produced between our own and foreign colonies by the exhibition of their respective products is no less beneficial to the world than that produced by the exhibition of the works of competing European manufacturers. The results may not be so easily measured, though they can hardly be over-estimated. It is one thing to read on such subjects, and another to see collected together, and on a large scale, specimens of everything calculated to be useful to man which our colonies produce.

Impressions thus vividly made on the mind are not soon forgotten, and it is hardly possible to conceive in how many ways they may be turned to profitable account. May we not, then, fairly ask, after the examination of these evidences of the vast wealth of our colonies and possessions, where is the Englishman who can desire to weaken, or even to disturb, the cordial feeling which now exists between them and the old country; or who will risk, by petty parsimony, the untimely separation from the mother country of such sources of strength and power?

What is our annual expenditure in connection with them to protect the persons and property of so many Englishmen, all contributing, by their energy and industry, to the prosperity of the empire, even if it be as large as some I think unfairly represent it to be, compared with the mines of wealth they have in store for us, with the friendship of the active and increasingly intelligent population so rapidly developing its power, or with the moral view of the question which makes England and Englishmen the foremost in diffusing civilisation and Christianity in all parts of the world.

I regret that there should be those who do not value the great results necessarily emanating from a wise and liberal government of our Colonial Empire, and who only see the present and judge of it in the narrowest spirit, as though the *maximum* effect of our colonial policy was already reached, instead of being in its infancy, and who attach no importance to the political and moral influence which belongs to this country, as the founder of such great communities, nor value the influence it must retain, when in the course of time, that spirit of independence which it is difficult to eradicate from the Anglo-Saxon mind, leads the colonists to the conclusion that they possess wealth, strength, and intelligence enough to govern themselves.

When this time arrives, as it certainly will, may we separate as nations acknowledging each others power, greatness, and intelligence; and speaking the same language, having the same ends in view, may our efforts be devoted to the promotion of each others prosperity.

But, impressed as I am with the importance of the duties the possession of this great power and influence imposes upon us, I cannot leave this portion of my subject —though I ought to apologise for the digression—without referring to the deep interest with which everyone must reflect upon the injury the moral tone and the upright manly character of the young and rising people in our colonies may sustain, if England looking only to temporary relief to herself, continues to supply them with population by compulsory emigration, embracing only one sex, and the vilest of that sex.

The supply of labour to a colony will, I humbly submit, be very dearly bought by drawing it from the most lazy, most vicious, and most polluted sources in the mother country. As an ardent admirer of our colonial system, as a sincere well-wisher for its prosperity, and a careful observer of recorded facts, I earnestly hope our colonies will not now or at any future time, allow any addition to be made to the number of our criminal population they have already received.

To sum up then, the effect produced by the study of the collections in the Indian and Colonial Departments, I would say that comparatively few of those who inspected them had previously more than a vague idea of the wealth and productiveness of the colonies, or of their progress since 1851. The introduction of railways, of electric telegraphy, and other important public works, as well as the discovery of gold and the accurate survey of unexplored lands, have together contributed to produce the great practical result indicated to us by the vast increase in the past ten years of their imports and exports, and I cannot doubt that the contemplation of these evidences of the bounty of Providence, will strengthen in the national mind the conviction of the importance of these possessions to the empire, and will enforce upon Parliament the necessity of removing from them, as far as it is possible by imperial legislation, every impediment to the freest commercial and political action.

I must not omit to notice the interesting collections of the industries and natural products of China and Japan. But, beautiful as they were, it is difficult to discover any material progress since 1851 in the application of their acknowledged ingenuity and taste to useful purposes, or to trace in their works any result of their increasing intercourse with European nations.

I will next consider what are the results of our experience in 1862, with reference to the management of future Exhibitions.

First. As to the Constitution of the Commission—its expenditure and receipts;

Secondly. As to the appointment of Juries and the system of Awards of Prizes; and

Thirdly. As to the circumstances which must guide us in determining when another Exhibition shall be held.

The principles on which the Commissions of 1851 and 1862 were constituted are essentially dissimilar.

That of 1851 embraced representatives of all classes—Members of both Houses of Parliament, members of large commercial and manufacturing establishments, and members of scientific bodies.

Scarcely a question could be raised on which one or more of the Commissioners could not afford practical information. This gave confidence in, and weight to, the decisions of the Commissioners. There were also several important Committees—the Building Committee, for instance, which greatly assisted the Commissioners. Under them, there was a large staff of able and zealous officers.

In 1862, the Commission consisted of only five members, who endeavoured to apply the rules and arrangements of 1851 to the management of 1862, but without the machinery by which they had been successfully worked.

The highest executive authority had not, within itself, the deliberative or creative power of the Commission of 1851, and the staff was very differently constituted. The adherence at first to precedent was probably too strong, and there was too great self-reliance on the part of some who were employed, which, when new and unforeseen difficulties arose, very much increased the labour and responsibility of the Commissioners, and interfered with that regular and harmonious working which was contemplated. There was not the practical knowledge and advice to fall back upon, or the physical strength to carry on the work which was available in every emergency in 1851; so that, notwithstanding the untiring energy of the Chairman, Lord Granville, and especially of his colleague and our colleague, Sir C. W. Dilke, and the invaluable services of the Secretary, Mr. Sandford, the work was too much for the Commission. This led to hurry and confusion at times, which the constitution of the Commission on the same principles as that of 1851 would have precluded. We hope, then, whenever another Commission may be issued, the precedent of 1851 will be followed rather than that of 1862.

Next as to receipts and expenditure. In 1851, a guarantee fund of £250,000 was subscribed at the last moment, by a comparatively small number of individuals. In 1862, before any decided step had been taken to prepare for the Exhibition, a guarantee fund, of nearly half a million sterling, was subscribed by representatives of all classes—Peers, Commoners, and men

of business—to cover any deficiency which might arise from an excess of expenditure beyond the receipts, and this large sum would have been considerably exceeded had the railway companies carried out the arrangement for a joint subscription to this fund, which was originally proposed.

The great success of this, the first step, proved the popularity of the undertaking, and perhaps gave an undue impetus to expenditure.

I cannot leave this part of my subject without noticing the services of the officers of our Society in the cause of exhibitions.

It may be thought that the acknowledgment by the public of the energetic assistance rendered by this Society to the cause of International Exhibitions includes that afforded by its officers, but there are officers to whom justice is not done by such indirect praise, and in placing on record my very strong opinion that the success of all the early measures connected with the Guarantee Fund, and of the negotiations with the Commissioners of 1851, was very materially promoted by the steady perseverance, knowledge, and tact of our officers, and especially by the exertions of our valued friend and secretary, Mr. Foster, I am only doing a tardy act of justice.

I am unable to give the particulars of the receipts and expenditure, as the report of the Commissioners is not yet published, but these details are of little importance, as my present purpose is not to enter upon a criticism of this or that expenditure, or to inquire whether one or the other might have been avoided. My object is to place a broad and general view of the results of the Exhibition before you, for which it is sufficient to say the receipts from various sources have covered the expenditure. I will therefore only add that I think scant justice has been done to the very great exertions of the Chairman of the Commission, Lord Granville, and his colleagues, for the heavy responsibility they undertook in directing this great undertaking. The sterling interest in the industrial progress of the country, which urges the voluntary discharge of such laborious duties by men of the highest rank and station, can only arise from a noble spirit of public duty.

We, the members of the Society of Arts, must feel deeply grateful to them. They undertook the direction of this work, believing all their labours would be encouraged by the active personal support of our late Royal President, of which they and the nation were so suddenly and lamentably deprived, as also by the countenance and support of the Royal Family. They entered upon their duties before the great calamity of the present day—the Civil War in America—had begun. It is needless for me to enlarge upon the effect on the receipts of the Commission, and the increase of labour and anxiety imposed upon them, in consequence of these unfortunate but deeply lamented events. I would rather ask you to consider how great would have been the *éclat* attending it, and how great would have been the pecuniary success, had the Exhibition received the inestimable advantage of the constant presence of the Queen, the Prince, and the Royal Family, and the still greater success which would have attended the festivals had they been presided over in 1862 as they were in 1851. Without this support in 1851 the Exhibition would probably have been a comparative failure; without it in 1862, thanks to the soundness and universality of the principles on which such international gatherings are based, we have accomplished a great success, greater indeed than that o 1851, when the unforeseen events of 1861–62 are fairly appreciated, and the difference between the wet summer of 1862 and the fine summer of 1851 is allowed for—11·94 inches of rain having fallen on 71 out of 159 days in 1862, whilst 6·91 inches only fell on 53 days out of 141 in 1851; nor must we forget the effect produced upon the receipts by the rival attractions, to visitors from the country, of the Crystal Palace and the South Kensington Museum, both of which popular and instructive places of public amusement emanated from the Exhibition of 1851.

Next, as to the prizes and the system of awards.

A difficulty arises in the consideration of this part of the subject, from the necessity of satisfying foreign as well as English exhibitors.

Our Society—having in view the various opinions which were expressed by persons who appeared equally capable of forming a sound judgment on the subject, and desiring that they should be recorded as soon as possible after the close of the Exhibition—issued a circular with questions, calculated to elicit information upon the working of the Juries and the distribution of Prizes, to which 114 replies were received.

Of these there were:—

	In favour of the Award of Prizes.	Against them.	Doubtful.
Exhibitors	20	22	5
Chairmen of Juries & Jurors	26	11	2
Neither Juror or Exhibitor	4	1	1
Foreign Commissioners ...	10	2	2
Colonial ,, ...	4	4	0
Total	64	40	10

But of the 64 favourable to prizes, several added strongly qualifying remarks to the effect, that they approved them if they could be given with perfect fairness and impartiality, and by juries intimately acquainted with the subject for which they were awarded. In 47 cases elaborate reasons have been assigned for the opinions given, of which 25 are for and 19 against prizes. There are 63 replies confined to the simple monosyllables, "Yes" and "No," of which 39 are for and 24 against them.

I will not venture an opinion upon the merits of the respective advocates for or against prizes, but simply state that I feel sure, when the question of prizes has again to be considered, it will be necessary, if it be determined to retain them, to revise with great care the rules under which the adjudications shall be made; and the cases now before the courts of law show how easily the public may be misled and injured by their means.

In stating the opinions of foreigners with reference to prizes, I ought to mention that Prince Napoleon, the President of the Exhibition of 1855, and of the French Commission issued in connexion with that of 1862, is decidedly opposed to them, and no one can have had better opportunities of forming a sound judgment upon this difficult subject, or be more fully informed upon the effect the absence of prizes would produce upon French exhibitors.

The next subject for consideration is the period which must elapse before another International Exhibition can be advantageously held in England.

This must be determined with reference to the object of such exhibitions; to the interests and wishes of foreign countries; to the interests of exhibitors, who expect to derive pecuniary advantages from exhibiting; and to the feelings of those who, having no personal interest to promote, contribute most materially by the loan of valuable works to their success, and without whose aid exhibitions would be deprived of their attractiveness to a large number of visitors; and also to the difficulty, which will increase with every succeeding exhibition, in finding room for the rapidly-increasing number of the products of industry.

Are we, then, to consider this question in its widest and most comprehensive aspect, as relating to an institution of the most cosmopolitan character, not originated for the benefit of individuals, though largely contributing to it, but in the interests of the world at large? Let us try and carry out the wise views of the Prince Consort, who described its object to be "to give a true test and a "living picture of the point of development at which the

" whole of mankind had arrived, and a new starting point " from which all nations will be able to direct their further " exertions."

This cannot be attained unless there be considerable periods between the Exhibitions. If we expect foreigners to contribute, as they have hitherto done, to the magnificence and usefulness of our Exhibitions, we must be prepared, as we did in 1855, to take a proportionate interest in theirs, and this not only on the ground of the reciprocal interchange of civilities between nations, but on national and interested grounds, for we cannot afford to be absent from any great international gathering of the world's industry, be it held wherever it may.

We cannot reasonably expect that the possessors of valuable works of art, without whose aid Exhibitions would be comparatively uninteresting, will be willing to part with them at short intervals of time, or that the manufacturers of large and expensive machinery can be constantly incurring the inconvenience and expense of sending to distant places the magnificent examples heretofore exhibited, or that valuable collections of natural products, from all parts of the world, can be brought together but at considerable intervals of time.

Too frequent International Exhibitions must, I think, deprive them of much of their interest, lower them in quality and in national importance, reduce them to bazaars rather than collections of the world's art and industry, and divest them of that special and most interesting and instructive purpose for which they were originated, viz., to mark at intervals, for the information of statesmen and those engaged in arts, manufactures, and commerce, the direction and progress of human industry.

Now that Exhibitions have become acknowledged institutions held in the interest of the industry of the world, and now that their novelty has passed away, they can only be supported by one class on account of the commercial advantages they afford, and by others from the pride they feel in being able, by the loan of valuable works to contribute to the pleasure and instruction of millions of people, and to uphold the reputation and greatness of their country.

I arrive, then, at the conclusion, that so long as International Exhibitions are confined to England and France, each country could hold one with advantage about every ten years, but that, now other states desire to join in this peaceful mode of promoting the industry of the world, and to receive their full share of the benefits arising from the freest interchange of products and manufactures, the intervals between them in each country must be longer. No advantage that could result to us from holding them more frequently can be compared to that the world will derive from their being held in countries where the people are unacquainted with the benefits which an accurate knowledge of the products and manufactures of other nations confers upon all. It appears to me, that having in view our own prosperity as the largest manufacturers of the world, an International Exhibition held in a foreign country, where the products of our industries are comparatively unknown, is of greater importance than one held in this country, which can be seen by comparatively very few foreigners. The value of International Exhibitions does not depend on the frequency with which they may be held in one country, but upon their being held in various countries at reasonable intervals, so as to diffuse their advantages among the greatest number of the citizens of the world.

I hope that the views I have now had the honour to lay before the Society have convinced you that the International Exhibition of 1862 has most thoroughly fulfilled the duty assigned to it. I find that by the mark set in 1851 we can note accurately an industrial progress in England, in our Colonies, and in Europe of a magnitude before unknown in a similar period. So distinctly, indeed, is it marked, that it almost becomes a statistical fact in the history of the world's industry.

I find that this progress has taken place during ten years, in which the industrial energies of this country been most severely taxed by foreign wars, by bad harvests, and by heavier public expenditure than has been borne for nearly half a century; and I find further, that these great discouragements have been almost entirely counterbalanced by the impetus given by the removal of nearly every legal impediment to the free action of our commerce with the world.

This has brought us such vast supplies of food and of raw materials in return for our exports (which have increased from 74½ millions sterling in 1851, to 124 millions in 1862) that misfortunes which in former times would well nigh have reduced our labouring population to want and misery, breeding social and political discontent, have scarcely been felt, and have placed us in 1863 in a position boldly to meet future difficulties, or, if they do not arrive, to move forward with still greater power and confidence than we have done during the eleven years which have just passed.

If, then, our industrious classes have gained so much by our recent commercial legislation, may we not inquire if there be any laws still in force which restrain the energies of inventors or restrict the free action of commercial pursuits?

Our reply must be that at home but few remain, while abroad there are still far too many; at home perhaps the most important, but respecting which considerable difference of opinion, I regret to say, still exists, is, in my opinion, our patent law, which is now receiving the attention of a Royal Commission.

I find, by the Jury Reports, that the most striking and characteristic feature of the Exhibition was a general improvement in the quality, and in the manipulative skill and taste employed in the production of most manufactures, whether English or Foreign, and not in the number or importance of new inventions.

The reporters on Paper, and on Iron and Steel, refer to the fact of the large number of patents taken out, and the poverty of the results accruing from them, and when we review the whole Exhibition, and compare it with 1851, and reflect that in the interval above 30,000 English patents have been taken out, independently of the registration of designs, and besides those taken out by foreigners in their respective countries, each patent securing to the patentee the monopoly of his fancied improvement for 14 years, we must, I think, be led to the conclusion, either that patentees have in most cases some other object in view in taking out a patent than securing themselves the advantages to be derived from a new invention, or that the patent law holds out to a speculative class the chances of winning a prize in a lottery too great for them to withstand, and therefore encourages a species of gambling in so-called inventions, by giving privileges to crude, ill-digested schemes, which, perfectly useless in themselves, are great incumbrances to the progress of real improvement.

I cannot express my opinion on the position the patent laws now so injuriously hold to industry more clearly than in the words which M. Chevalier applies to the patent laws of France:—" Patents," he says, " were born of " a sentiment the object of which was the protection of the " rights of intelligence. Patents are now injurious to " industry, and experience shows they do not secure real " advantages to inventors, or, if at all, very rarely. In " the few instances of benefit derived from patents, the " profits have gone to the hornets and not to the industrious bees."

But in foreign countries there is yet a great deal to be done before International Exhibitions can fully realise their glorious mission, and we must look with intense interest to the progress and gradual adoption of free-trade principles abroad. Judging by the effect of their application to our own trade and commerce in the last ten years, it is difficult to limit our expectations as to the vastness of the results which will follow their adoption by the great European Governments, and nothing will hasten it so much as holding International Exhibitions in countries where prohibitory and restrictive commercial laws are still

in force. When this time comes, and there are most encouraging signs that the public mind of Europe is steadily advancing towards it, we shall have to record industrial progress which will as far eclipse anything we have yet experienced, as the richness of their natural products, and the population and area of the other European States, exceed those of the United Kingdom.

But whilst we are thus looking to the Old World with hope, and to the seats of despotic Government for commercial freedom and progress, we cannot forget that discouraging blot which so lamentably disfigures the New World. That the country which, but a little more than two years back, prided itself on being all but the best governed, and its people the most universally educated and peaceable in the world, should so suddenly disregard the lessons of experience, lessens the confidence with which we otherwise should believe in the early accomplishment of universal free trade.

The recently free and educated America has dealt a heavier blow to the progress of commercial liberty than has been for a long time past inflicted by the combined action of despotic governments. They have advanced, though slowly, while America has retrograded rapidly. It is, however, as impossible to believe that the advantages of the freedom it has hitherto enjoyed will be forgotten, as it is to believe that the evils attending the operation of prohibitive and restrictive laws will not, when the temporary excitement of war has passed, make themselves as apparent and as oppressive and obnoxious in the New World as they have become in the Old.

Let us then hope that before the next ten years have passed, prohibitory and restrictive commercial laws will be abolished throughout Europe—that our inventive power may be relieved from the only load now pressing upon it, and that in the new world we may see, long before that time, a restoration of peace, and with it the reacknowledgment of those principles of freedom, personal and commercial, without which, no matter what the form of government, nations cannot be contented and prosperous; and, in conclusion, I have only to express my conviction, which I believe will be fully responded to in this room, that when the proper time arrives our Society, as in 1851 and 1862, will be fully alive to the discharge of its duties, and as efficient as it has hitherto been in its endeavours to promote International Exhibitions.

DISCUSSION.

The Marquis of Salisbury said he rose to express the gratitude which must be universally felt by all present to the gentleman who had read the excellent paper they had just heard. He believed, according to the forms of this Society, there was generally some discussion upon the subject which had been brought before them, but anyone who looked at the wide and comprehensive nature of this paper, and the large number of topics it embraced, would feel with him that any discussion upon it must necessarily be very desultory; that no individual subject could be treated of in a manner which its importance deserved; and that, therefore, it would be much better to reserve for future consideration any particular details of the very excellent paper they had just heard. The object of that paper had been to show the great progress that had been made in industry and art since the Exhibition of 1851, and that that progress had been most satisfactory could not be doubted. In the recent Exhibition they had been favoured with the kind assistance of his Royal Highness, who occupied the chair at the opening ceremonial, and for this they were truly grateful They only hoped that, on all future occasions, they would meet with the same support from his Royal Highness and the noble house to which he belonged, in the encouragement of all that tended to promote the arts, manufactures, and commerce of the country. There was every reason to be satisfied with the evidence that had been brought forward of the great progress this country had made, and there was no doubt it had largely contributed to the improvement which had taken place over all the world. They were much indebted to the gentleman who had devoted so much time and attention to bring this subject before them in a condensed and at the same time very comprehensive form; and he thought he could not do better than propose that the thanks of this assembly be most cordially given to that gentleman for his labours. He would conclude by moving a vote of thanks to Mr. Hawes.

Lord Ebury said the deep interest he had taken in the Exhibitions of 1851 and 1862 made it a very great pleasure to him to second the motion of the noble Marquis. He could not but think that the Council of this Society were entitled to their thanks for having given the Society this opportunity of hearing so eloquent a paper upon the results of the late Exhibition. Events succeeded each other with such rapidity in this country, and in the world at large, that if we did not stop to note their effects upon society, the impressions produced were transient, and soon became effaced. It must be obvious to all that they had had this evening a most able conductor throughout the whole Exhibition, from one end to the other—a conductor who had taken them lightly over all the principal objects exhibited, but who had only been able to do this through the deep study he had evidently himself bestowed upon every department of that Exhibition. There had been some things stated which, perhaps, were not flattering to our national vanity, and this, he thought, showed that this paper had been drawn up, at least, with impartiality. Other statements must have been gratifying to us; and in treading upon that ground, which probably interested those present more than any other—he meant the ground of Art—Mr. Hawes had stated very clearly the various excellencies and deficiencies of the last Exhibition; but there was one country which he (Lord Ebury) thought had not been touched upon so prominently as it deserved—he referred to Denmark, with which we had recently been so auspiciously connected, and the works of which, in his opinion, were perhaps, for its size, the most remarkable of any that appeared in the art department of the Exhibition. He thought they could hardly overestimate the value of such a paper as that which had been brought before them this evening, while those matters were fresh in their minds. It was a document they could refer to on future occasions, and he thought the recommendations given, both with regard to the composition of the Commission, and with regard to the length of time which ought to elapse between one exhibition and another, must have recommended themselves to the good sense and reason of all who had had the advantage of hearing them. Under these circumstances he had sincere pleasure in seconding the motion which had been proposed by his noble friend.

Mr. Marsh Nelson said the speech by the noble lord who had just addressed the meeting showed how undesirable it was to deviate from the usual custom of discussing the papers brought before this Society. The noble lord had pointed out an omission in the able paper read by Mr. Hawes, and he (Mr. Nelson) would take the liberty of pointing to one or two matters which had not been referred to in that paper, with the view of doing as they had been invited to do by Mr. Hawes, namely, using the experience gained in the late Exhibition as a guide to any future undertaking of a similar kind. He (Mr. Nelson) could not but think that if the recommendations from time to time proposed by this Society to her Majesty's Commissioners had met with a little more attention, a great many of those faults which were patent, not only in this country, but throughout Europe, might have been obviated, more particularly, he believed, the financial results would have been different. On the last occasion, when they had the pleasure of discussing this subject under the presidency of Lord Granville, the noble lord admitted that a great deal of practical good resulted from that discussion. Having quoted the remarks of a writer in favour of exhibitions being arranged according to classes and not coun-

tries, Mr. Nelson went on to remark—that upon the proceedings of the meeting to which he alluded appearing in the French papers, Prince Napoleon said he was so satisfied that that was the proper mode of arrangement, that he was determined to adopt it in future exhibitions in France. What an opportunity the Commissioners of the late exhibition had lost in not being the first to adopt this system! Another suggestion was that in any future exhibition the greatest economy should be exercised as to the building. The contract for the first exhibition building was £79,800, and with the gratuity to Messrs. Fox and Henderson and extras, the cost was ultimately raised to £161,000. The extent of the first exhibition, as compared with the second, was about the same. The first contract entered into by the Commissioners of the late Exhibition was £300,000—nearly double the amount paid for the first building, including the gratuity to the contractors. If proper economy had been exercised, instead of a deficiency, made up by one of the contractors, there would have been a very large surplus. Another point for consideration was the result of the Exhibition with reference to this Society itself. This Society was the principal promoter of the Exhibitions of 1851 and 1862. By the agreement with the Commissioners, in consideration of those exertions, it was originally stipulated that if the building were retained permanently the Society was to have possession of a portion of the picture gallery. Shortly afterwards the Commissioners asked the Society to annul that agreement by the substitution of the words "provided the Exhibition succeeds," for the words "if the building is permanently retained." The result was, that although the building was intended to be retained, and although Parliament was about to be called upon to vote a sum of money from the public funds for the purchase of it, the Society of Arts was to receive no advantage. He must say he thought in this respect that Mr. Cole had been rather negligent of the interests of the Society; and he thought, moreover, the Society was fairly entitled to that portion of the building which had been originally conceded to it. Another question to discuss was the results of the Exhibition to the public. Those results were shown in the paper just issued by Parliament, from which it appeared the country would be called upon to vote nearly half a million of money for the purpose of retaining that hideous building. The gentleman who had read the paper had but very slightly alluded to the subject of the building. He knew what the feeling was in this room this time last year when it was discussed, and it was he who rose in his place as a member of the Council to ask Lord Granville to omit that question from the discussion, but Lord Granville very properly said, "If you talk about the Exhibition, everything which pertains to it, within and without, is matter for discussion," and he could not help thinking that the ingenious advice of the two noble lords who had addressed them this evening, not to enter into a discussion upon the paper, was in order to prevent, as far as possible, that knotty and somewhat disagreeable point being entered upon on this occasion. It was somewhat *apropos* that the subject should have been brought forward a few days before the purchase of the building would have to be considered in Parliament, and he could not believe that Parliament would sanction such a lavish expenditure of the public funds. Let them look at the results. The first Exhibition building cost £161,000. That was a building universally admired, and one which was more or less copied by every country who had an exhibition subsequent to that of 1851; but notwithstanding the advice of this Society, that that should be the prototype of the building of 1862, a building was erected for which Parliament was now asked to give £80,000, and to spend £284,000 in altering or completing it, nearly double the first cost of the Exhibition of 1851, and £128,000 more than the cost of the Crystal Palace, including the purchase of the Hyde-park building. The total cost of the Crystal Palace was £235,000, and yet the country was asked to expend £284,000 in altering this monstrous building. If the alteration were such as to make it a building worthy of the country, he would be the last to oppose it; but on every principle of design, plan, and architectural effect, that building had been universally condemned. In the first place, the building was below the level of the streets; some dozen steps had to be descended to reach the main portions of the structure, and they could never raise it up, and if any one took the pains to examine the beautiful drawings in the Royal Academy this year, and compared them with the building itself, they would find that there was not a chance of their being carried into effect, as they differed so materially from the structure now standing at Kensington; and he believed the end of this business would be, that a report would be made that it was impossible to alter the present building, that it would be better to sweep it away and go to Parliament for another grant. The Chancellor of the Exchequer explained, so far as he was able to do so, what this £284,000 was for. He was asked whether it was for the purpose of carrying out any new design, when he replied that that estimate was merely that the building might assume a decent appearance. Could anything be more insulting to the common sense and taste of the country? If the present site was a desirable one let it be purchased, but sweep away the building and begin *de novo*. The building had been declared to be unfitted for the objects for which it was erected, not only by architects of great experience, but by the public. It bore no comparison to the Crystal Palace, and yet it was to be made a fixture and a permanent disgrace to the country. He thought, as far as the results to the public were concerned, if this building were to be perpetuated it would be a lamentable thing for the country.

Mr. Henry Cole said Mr. Nelson had thought proper to introduce his (Mr. Cole's) name into this discussion, and if that personal allusion had not been made he would have left Mr. Nelson's statements to speak for themselves, but he challenged that gentleman to produce any authority whatever for the statement that he (Mr. Cole) had been any party to the negotiations for the sale of the building to the government. On his honour he stated he had had nothing whatever to do with it. He had not even been consulted upon the matter by any member of the government, and he had had nothing whatever to do with any negotiations between the government and the contractors for the building; and he declared that every syllable Mr. Nelson had uttered on that subject was positively untrue. He could go through many of the other statements, and show that they were equally untrue. To refer to one instance alone—as to the extent of the building of 1851 being equal to that of the building of 1862—the difference was as between 18 acres and 26 acres of ground; that was a fact which Mr. Nelson could determine for himself. He had no intention of following Mr. Nelson throughout his statements, and would not have risen except in his own justification.

Mr. Newton Wilson, while agreeing with the views of the noble lords who had suggested the inadvisability of entering upon the discussion of so comprehensive a paper this evening, expressed a hope that the Council would afford a future opportunity of considering many points of great importance which had been introduced in the paper, and which he considered were proper subjects for full and deliberate discussion by the members of this Society.

Mr. J. H. Murchison remarked that the temper and tone displayed by certain members of the Council did not tend to prevent the display of unpleasant feelings whenever the subject of the Exhibition building was brought before the Society. He thought a great deal, if not the chief cause, of the difference of opinion that existed with regard to the merits of the building had been occasioned by the manner in which the selection of it had been made. One great object of this Society was to promote art, and a more splendid opportunity of bringing forward the architectural ability of the country never occurred than would have been af-

forded by inviting designs and plans for the building for the late International Exhibition. But the public heard nothing of the building till it was selected and contracted for, and it was certainly an important omission from the paper that it had not shown that in future exhibitions it would be desirable that a different mode of selecting the building should be adopted. He would not occupy the time of the meeting longer on this occasion, because he believed it was the intention of the Council to afford an opportunity at a future time for discussing this subject in the most unreserved manner. He regretted that it should have been brought forward at the end of the session rather than at the commencement, when the whole subject might have been fully considered and discussed in a manner which its importance deserved.

Mr. Marsh Nelson stated, in explanation, that the superficial area of the building of 1862 was 720,000 feet, and that of the building of 1851, 786,200 feet. He was comparing the 1851 building with that of 1862 as it would be sold to the country. The only difference was in the eastern and western annexes to the present building.

His Royal Highness the Duke of Cambridge then rose, and said his remarks would be very brief, as he felt himself in a somewhat difficult position. It was true that he had had the honour of taking part in the opening of the Great Exhibition of 1862, but that was a circumstance which did not in the slightest degree originate from any personal qualifications he possessed to undertake that duty, for he had no intimate acqaintance with subjects of this kind. As a soldier, he had naturally principally devoted himself to military affairs, and that circumstance alone very materially disqualified him from giving a correct opinion upon the subjects treated of in the paper. He had alluded to the fact that he had been placed in a somewhat peculiar position in connection with the late Exhibition, from a circumstance which had been adverted to by the gentleman who had given them so able and eloquent a description of the results of that exhibition. That circumstance was a loss which no Society could feel more deeply or more continuously than the Society he had now the honour to address. It was a loss which had been experienced by this great and powerful nation. It was a loss which had been felt from the highest dwelling to the humblest cottage. It was a loss which had been felt in our distant colonies. It was a loss which was felt by none more than by those connected with the arts and sciences of this country; for he was quite sure that to that great and illustrious Prince was due much of the progress that had been made. It might with justice be said, that since the time when he assumed the high and prominent position he so nobly filled during his lifetime in this country, a new impulse was given to the arts and sciences here. Now, in no respect was this more felt than with reference to the Exhibitions of 1851 and 1862, for if it had not been for the Prince Consort, he thought it probable that the Exhibition of 1851 would never have taken place. Personally, it was true that his Royal Highness took no immediate part in the Exhibition of 1862, but it was well known that his invaluable advice was in the early stage of that undertaking anxiously sought for by those who managed the Exhibition. Though not ostensibly connected with that Exhibition as he was in 1851, still his spirit had pervaded it, and therefore he (the Duke of Cambridge) felt justified in again paying that testimony of respect to his memory, which could never be offered more appropriately than at a meeting of this Society, over which he had so ably presided. He must confess he thought the suggestion of his noble friend the Marquis of Salisbury, in moving the resolution, was wise and judicious, viz., that so many important and interesting subjects had been alluded to in the able paper they had heard from Mr. Hawes, that there was hardly time or opportunity to discuss them satisfactorily on this occasion, and any discussion must necessarily be of a very desultory character. He could not but think that what they had just experienced proved the noble marquis to have been right; because, although it was perfectly true that it was competent for any gentleman who had any observations to make to address this meeting, yet he did not see that the observations which had been made could lead to any useful results, for they were merely a display of personal feeling, which he thought, although it might exist, ought not to have been brought forward on this occasion. Whether the building was a good building or a bad building, he was sure they did not expect him to offer an opinion, and he thought that Parliament was a more fitting place for the discussion of such a subject. To return to the observations of the gentleman who had so ably brought the whole question of the Exhibition before their notice, he (the Chairman) could never regard that Exhibition except as one of the greatest importance, at the same time he thought the suggestion that those exhibitions should not be too frequent was deserving of the highest consideration. If these international meetings occurred at prolonged and stated periods—say of ten years—probably that might be the best period of interval—there was always time for reflection, time for new inventions, and for making use of the experience gained on the former occasion. It was right that time should be given for new developments of industry, and for the results of any improvements in commercial legislation. They could not say that the system of free-trade had been yet fully developed, although it had been established for a considerable number of years. Then, again, there was the great commercial treaty with France. They would not say that all the advantages of that treaty had been yet brought out. It was necessary in undertaking these International Exhibitions that a certain period of time should elapse for the world to settle down to those great and inevitable changes which were constantly going on. Then, again, if they looked to the objects of those gatherings, they ought not to be made too common, so as to lessen the interest, for if the interest were lessened the good done was in a great degree lost. He had heard, with pleasure, the observations which fell from Mr. Hawes with reference to our colonial possessions. If there was one department which, as an Englishman, gave him more satisfaction than another, it was the admirable collection of productions from our various colonies. The colonies were thus shown in their different stages of development, some that were backward in bringing out the advantages they possessed, and others far advanced, and rapidly coming into competition with ourselves. He thought it was a great and glorious thing for England to think she had these colonies, which looked up to the mother country with satisfaction and pleasure, and were gradually preparing themselves for a position which he hoped they would one day attain, independence. But it was in his opinion most undesirable to hasten this; on the contrary, he thought it was desirable, both for the mother country and the colonies themselves, that they should obtain their independence as gradually as possible. Of late years it had become rather the fashion to treat our colonies with very little consideration, and to speak merely of the expense they were to the mother country, without looking at the advantages they conferred. He was persuaded it would be a great error if that view were general, but he did not believe that was the opinion of the people of England. He believed there was a class of people imbued with it, but he thought the generality of Englishmen entirely disapproved of the idea of suddenly, rapidly, and he might say almost unreservedly getting rid of our colonies; and, therefore, what they saw in the Exhibition of 1862 ought to make them desire by every means in their power to foster and support those colonies by good legislation and by kind support. He thought the immediate subjects connected with exhibitions had been so exhausted by the paper read, that there was nothing remaining for him to add to what had fallen from Mr. Hawes; and in concluding the few observations he had ventured to make, he would only express to the meeting his regret that on this occasion they should

have had the disadvantage of being presided over by one who, at the outset, explained how difficult was his position, but who had endeavoured, in the circumstances in which he was placed, to discharge that duty to the best of his ability. His Royal Highness concluded by putting the resolution that the thanks of the meeting be given to Mr. Hawes for his able and valuable paper.

The vote of thanks having been passed,

Mr. Hawes, in acknowledging the compliment, expressed his thanks for the reception that had been given to his paper, and said that he had not disguised, at the commencement of his remarks, that he intended to treat the results of the Exhibition in their commercial, artistic, and manufacturing aspects. He had carefully endeavoured to avoid introducing any topic which he thought might create difference of opinion in the meeting, and had only wished to lay before them a few results, entirely without reference to private feelings which some persons might entertain with regard to the building itself. He had not thought that a subject for discussion by the Society at the present moment, and he was glad to find the view he had taken so ably supported by his Royal Highness in the chair. He thanked them for listening to him for the third time on this subject. He had almost feared it had been exhausted, but he was happy to find that exhibitions were still as popular as ever, and only required to be directed with care and judgment to insure success.

The Secretary announced that the Annual General Meeting would be held (in accordance with the Bye-Laws) on Wednesday, the 24th inst., at 4 p.m.

THE ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

At the ordinary monthly meeting of the Executive Committee of this Association, held at Manchester, March 31st, William Fairbairn, Esq., C.E., F.R.S., President, in the chair, Mr. L. E. Fletcher, chief engineer, presented his Monthly Report, of which the following is an abstract:—

During the past month, there have been examined 370 engines—1 specially; 492 boilers—6 specially, 17 internally, 60 thoroughly, and 409 externally, in which the following defects have been found:—Fracture, 2 (1 dangerous); corrosion, 18 (2 dangerous); safety valves out of order, 4; water gauges ditto, 24 (1 dangerous); pressure gauges ditto, 16; feed apparatus ditto, 5; blow-off cocks ditto, 47 (1 dangerous); fusible plugs ditto, 5; furnaces out of shape, 3 (1 dangerous); over-pressure, 2; deficiency of water, 2; blistered plates, 2. Total, 130 (6 dangerous). Boilers without glass water gauges, 1; without pressure gauges, 1; without blow-off cocks, 36; without back pressure valves, 58.

Explosions.

It will be remembered that in last month's report no detailed particulars were given of No. 1 explosion, which occurred to a boiler not under the inspection of this Association, and which was of the double furnace, internally fired class. Particulars have, however, been since obtained, and show that the explosion was of a very simple character. It was the practice to keep up a fire in this boiler throughout the night, for the purpose of heating the mill, and a boy was left in charge to attend to it. The demand made upon the boiler for steam was such that no supply of water would carry it through the night, and therefore it was the duty of the attendant to make up the deficiency with the donkey pump. This, however, he neglected to do, in consequence of which the furnace crowns were laid bare, the plates became red-hot, and collapse ensued. The boy was absent from the boiler at the time of the explosion, neither was any one else near it, and thus happily no lives were lost nor any one injured, while the damage to property was confined to that done to the boiler itself.

This is just one of those cases in which a low-water safety-valve would have been of service, not only by its giving an alarm before the furnace crowns were laid bare, but also by letting off the pressure of steam.

Two explosions have occurred during the past month to boilers not under the inspection of this Association, by which 15 persons were killed, and 16 others injured, making a total of 31. Both boilers have been personally examined subsequent to the explosion. The following is the monthly tabular statement:—

Index No.	Date.	General Description of Boiler.	Persons killed.	Persons injured.	Total.
No. 4.	Feb. 23.	Vertical Iron Works Boiler. Internally fired.......	13	15	28
No. 5.	March 17.	Ordinary double flue, or "Lancashire." Internally fired.	2	1	3
		Total.....................	15	16	31

No. 4 explosion occurred at an iron works, to a boiler connected to a series of eighteen others. It was very similar in general construction, though not precisely so, to those known as upright furnace boilers, like which, it stood erect, was of considerable height, and surrounded with brickwork. They, however, are heated by the flames passing off from the iron furnaces, which play first upon the outside of the shell, then pass through openings in the side into an internal descending flue, and escape to the chimney; while the boiler in question had its own independent furnace, placed in the internal flue, which was thus converted from a descending to an ascendeing one, the openings at the side becoming outlets for the flame instead of inlets. The top of the boiler was hemispherical, and the bottom flat; whereas in the ordinary furnace class, both ends are hemispherical, which is an important difference.

The boiler was 20 feet high, and about 9 feet 6 inches diameter. The internal fire box was 10 feet high, 4 feet 6 inches diameter at the crown, and also for about the first 3 feet 6 inches below; from which point it tapered outwards to a diameter, at the bottom, of 6 feet 6 inches, leaving an annular water space all round, about 18 inches in width, between it and the shell. This fire box was united to the shell at the bottom, by a flat plate connected by rings of angle iron inside the water space. The crown of this internal fire box was slightly domed, and flanged at its attachment to the cylindrical slides, being amply stiffened by six angle irons laid across and well riveted to it. At the upper part of the fire box, were the two outlets previously referred to, and which were formed by short transverse flues passing through the water space, and thus establishing a communication between the internal furnace and the external flue. These short flues, which were opposite one to the other, and at right angles to the furnace door, were 2 feet 6 inches in diameter, and attached by rings of angle iron at each end.

The thickness of the plates was: in the hemispherical end and cylindrical sides of the external shell, three-eighths of an inch: in the flat plate at the bottom of the water space, seven-sixteenths: while all the angle irons were 3 inches by 3 inches and half an inch thick. In the fire box the thickness of the crown plate was half an inch, and that of the sides seven-sixteenths.

With regard to the lay of the plates, that in the shell was according to the usual plan, being radial in the hemispherical end, and circumferential in the cylindrical sides, the seams in the latter breaking joint; while in the taper portion of the fire box, the plates were laid longitudinally, and thus, which it is important to notice, the seams were in line for a length of between six and seven feet. The

riveting was single throughout, and the seams were the ordinary overlap.

The boiler had been fitted with a float, two gauge taps, one feed stop valve, one feed back-pressure valve, and one lever-safety valve of 5 inches diameter, which was loaded to a pressure of nearly 50lbs., and at all events would have allowed the steam to have reached that pressure when blowing off freely. Also there were two junction valves, one of which was in the steam-pipe communicating with the entire series of boiler, and the other in that connected to the steam hammer. There was no steam pressure-gauge on the boiler itself, but one was fixed to the main steam pipe beyond the junction valve, and thus afforded no indication of the pressure of the steam within the boiler, when it was shut off from the others in the series. Both of the junction valves were closed at the time of the explosion, and thus the safety-valve formed the only outlet for the steam. What the pressure then rose to cannot now be ascertained, the steam pressure gauge, as just pointed out, giving no indication under such circumstances. The safety-valve, however, was found to be free after the explosion, and there is no reason to conclude that it had been otherwise previously. But it is apparent from this how circumstances will arise which make it important that every boiler should be fitted with a duplicate safety-valve, as well as with its own independent pressure-guage.

A very general impression exists that the cause of most, if not of all the explosions that occur at iron works, is to be found in the old age and dilapidated condition of the boilers; such, however, was not the case in this instance; the workmanship of the boiler was satisfactory throughout, and its condition good. It was reported to have been at work only a few months, which its appearance corroborated. Were all boilers in as good a condition as this one was, explosions would be of much rarer occurrence than at present.

The cause of this explosion was not "shortness of water;" the crown of the fire box was uninjured, the colour of the plate black, a thin scale covering portions of it, while the rents made in the boiler were not those which a deficiency of water would have occasioned.

A serious oversight had been made in the design of the boiler, the top end being hemispherical and the bottom flat. The hemispherical end would, when the steam was fully up, and blowing off freely, have an upward pressure nearly of 250 tons acting upon it and tending to tear it away from the bottom. There would be an equal downward strain counteracting this, induced by the pressure of the steam upon the crown and tapering sides of the fire-box, combined with that upon the flat plate forming the bottom of the annular water space. As long as the attachment between the bottom and the top of the boiler held good, the two forces would be in equilibrio, and the boiler remain at rest upon its bed. But should the attachment fail, the upward force would instantly shoot the top of the boiler up into the air with a buoyancy of 250 tons, which it may be remarked, is equal to the weight of a long railway train, including the engine and tender fully equipped with coke and water. This action is exactly what took place. The flat plate at the bottom gave way, rending completely round through the seam of rivets, at the outside ring of angle iron which attached it to the shell; when the boiler flew up and was carried to a distance of 160 yards from its original seat. The brickwork at the top of the chimney was shaken, and there were marks of violence on the crown of the boiler, so that it is possible that it struck the top of the chimney in its course. There is nothing surprising in this, when the amount of the pent-up force of steam within so large a boiler is considered, and the due appreciation of which shows how unnecessary is the supposition of the existence of explosive gaseous compounds, or any force greater than that of the steam itself; while the propagation of such theories only tends to divert attention from the real cause of steam boiler explosions. The rent at the flat bottom plate however was by no means the only one that was made. The short transverse flues passing through the water space, and which considerably assisted the bottom plate, also gave way, and were torn from both the shell and fire box, their mode of fracture giving unmistakeable evidence of the upward flight of the shell. The resistance of these flues to fracture, had severed the fire-box in the waist at the ring seam of rivets, at which the longitudinal plating terminated; and thus the fire box crown, as well as one ring of plates with the two short flue tubes, had flown up together with the shell, which made a somewhat remarkable and complicated feature in the development of the rents. Added to this, the remaining portion of the fire box, which was taper, and placed longitudinally, rent at one of the longitudinal seams opposite the fire door, and collapsed at that part.

Some difference of opinion has existed amongst the engineers who have examined the boiler, as to whether the explosion originated at the rent of the flat bottom plate, or at the collapse of the fire-box. Though there may be some difficulty in determining which was the weaker spot of the two, there has been none in deciding that the boiler was inherently defective; and the opinion has been unanimous that there is no evidence for attributing the explosion either to "shortness of water" or excessive pressure, but that it was clearly owing to the malconstruction of the boiler itself. It may be added that the application of the hydraulic test would have detected and exposed the weakness both of the fire-box and bottom flat plate, the former, by its temporary flattening, the latter by the movement and rising of the outer shell.

The jury at the coroner's inquest came to the following conclusions, which are quite in accordance with the preceding report:—"That the explosion was caused by the bad construction of the boiler; that every boiler ought to be supplied with a steam pressure-gauge; and that no new boiler ought to be put to work before it has been examined by some competent engineer and pronounced to be safe."

No. 5 Explosion, occured to one of two mill boilers working side by side and connected together, both being of the plain double-flued, internally-fired class, termed "Lancashire."

The length of the one in question was 28 feet, the diameter of the shell 10 feet, and that of the flues, which were parallel throughout their whole length, 3 feet 9 inches; the thickness of the plates was seven-sixteenths in the shell, and three-eighths in the flues. The boiler had been fitted with one glass water-gauge, one feed back-pressure and stop-valve combined, one blow-out tap, one lever safety-valve, and one Schaeffer steam pressure-guage, common to both boilers. The pressure at which the safety-valve was stated by the engine attendant to have blown off, was 30lbs. on the square inch, which an examination of its dimensions, lever and weights corroborated.

On examining the boiler it was found that the right-hand flue had collapsed from one end to the other, and by the flattening action had become severed completely in two at some of the ring seams of rivets, as well as torn away from the end plate at the back of the boiler. The boiler had not stirred from its original position, and the connections to the one alongside remained unbroken.

The rush of water, however, from the opening at the back, had blown up the brick flue and carried away the end wall of the boiler-house, in consequence of which a floor above, as well as some cast-iron girders by which it had been supported, were brought down. It was by the fall of the building that the three men received their injuries, one of whom was found to be dead when dug out of the *debris*. At the front end of the boiler the furnace mountings had been blown off.

The amount of damage done to the surrounding property was comparatively inconsiderable, and this is generally found to be the case where explosion is confined to collapse of the internal flues. Where, however, the ex-

ternal shell gives way, the consequences are much more serious. The boiler does not then remain quietly in its seat as it did in the present instance, but—to the effect of the percussive action of the steam, which was the only element of injury in this case—adds that of the flight of the fragments of the shell, as in the preceding No. 4 explosion, as well as in the one that occurred to an ironworks boiler in December last, the particulars of which were given in the report for that month.

With regard to the cause of the collapse, there was no evidence of "shortness of water," judging from the appearance of the plates; added to which, the other furnace in the same boiler remained unaltered in shape, which could not have been the case had deficiency of water occurred: while, in addition, it appeared that the collapse of the flue had commenced at the middle of its length, and not over the furnace, where the shape was less distorted than at any other part.

The collapse cannot be fairly attributed to "shortness of water," but its true cause will be found in the construction of the flue, which was not strengthened with flanged seams or the addition of any hoops. Such a flue as the present, of so large a diameter as 3 feet 9 inches, and 28 feet long, made of plate only three-eighths thick, is not safe for regular work with steam at a pressure of 30 lbs. per square inch, as was the case in this ins ance. It might work for a time, but still there would be a risk, as the event proves; a risk that might have been avoided had the flue been strengthened with any of the approved methods, namely, flanged seams, or hoops, either of angle iron, T iron, bridge rail section, or any other suitable form; to the importance of which attention has been called, it is feared with tedious frequency, though an apology for so doing, it is thought, may be found in the repeated occurrence of such explosions as the present, and in the loss of life consequent upon them.

It may be here added, there is every reason to conclude that the boiler in question was an illustration of the danger referred to in previous reports, arising from internal flues being actually oval, although supposed to be circular. The angle iron rings at the end plates were circular, but the inclination of the axis of the collapse of the flue indicated that the middle portion had been oval. The other flue alongside was evidently so, and had, in consequence, been strengthened by two stays attached to the crown. The flues of all the boilers under inspection of the Association are guaged to ascertain their actual shape, when the members allow an opportunity of making "thorough examinations," without which it cannot be done; and very numerous are the instances in which flues, previously supposed to be circular, are found on actual measurement to be oval.

This explosion is one that must be added to the category of those caused by mal-construction of the boiler, and cannot be termed accidental. The application of the hydraulic test would have detected the weakness, and the adoption of any of the approved methods of strengthening flues mentioned above, prevented the explosion. These preventives have now become common knowledge, they can be applied at little expense, and by any ordinarily competent boiler maker, and thus are within the reach of all. It may therefore be fairly pointed out that their rejection by one manufacturer is an act of injustice to others, since nothing can operate more directly to induce government interference with the present unfettered use of steam, than the frequent occurrence of loss of life through the neglect of precautions so simple as those just alluded to.

Home Correspondence.

CARBURATION OF GAS.

SIR,—In the discussion on Mr. Paul's paper, Mr. Scott says that Mr. C. Mansfield was "the first person to propose what was now called the carburation of gas, to increase its illuminating qualities." It will be found that Low patented the process in 1841, and alluded to it in a general way in a previous patent of 1832, the claim in which is so comprehensive that, if valid, it would render doubtful all subsequent patents. The process has been patented more than twenty times since, and yet a Joint Stock Company is just now in the market proposing to purchase the patent rights (?) of a Frenchman for the sum of £50,000. I am, &c.,

W. SYMONS.

17, St. Mark's-crescent, Regent's-park,
June 3rd, 1863.

MEETINGS FOR THE ENSUING WEEK.

MON. ...R. Geographical, 8½.
TUES. ...Medical and Chirurgical, 8½.
Zoological, 9.
Syro-Egyptian, 7½. Mr. Sharpe, "On the various dates of the several parts of the Pentateuch."
Anthropological, 7. Mr. R. S. Charnock, "Science of Language."
Royal Inst., 3. Prof. Tyndall, "On Sound."
WED. ...Microscopical, 8.
R. Literary Fund, 3.
R. Soc. Literature, 8½.
Archæological Assoc., 8½. 1. "On Leaden Objects found in London by the late C. Ainslie, Esq." 2. Mr. Cuming, "On Seals of the Bishops of Man." 3. Mr. T. Wright, "On the Jewry Wall, Leicester." 4. Mr. Moore, "On further Roman Discoveries at West Coker, Somerset."
Royal Horticultural. Uncovering of Memorial of Exhibition of 1851.
THURS...Royal, 8½.
Antiquaries, 8½.
Philosophical Club, 6.
Royal Inst., 3. Prof. Ansted, "On Geology."
FRI. ......Astronomical, 8.
Royal Inst., 8. Prof. Tyndall, "An Account of some Researches on Radiant Heat."
SAT.......Royal Botanic, 3¾.
Royal Inst., 3. Professor William Thomson, "On Electric Telegraphy."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 29th*, 1863.]

Dated 2nd April, 1863.

845. W. H. Phillips, Nunhead, Surrey—Imp. in means or apparatus for cleaning the bottoms of ships or other floating vessels.

Dated 20th April, 1863.

981. C. Blanc, 8, Rue Chapen, Paris—Imp. in apparatus for the purpose of using air and steam as motive power.
983. W. E. Newton, 66, Chancery-lane—Imp. in lamps. (A com.)

Dated 22nd April, 1863.

1005. J. Lee and E. Dawson, Tammerfors, Finland—Imp. in looms for weaving.

Dated 24th April, 1863.

1021. P. Passavant, Bradford—Imp. in the manufacture of blue colouring matter, and also of violet colouring matter. (A com.)

Dated 25th April, 1863.

1035. L. A. J. Bruet, Paris—Imp. in apparatus for registering, indicating, and verifying the time and distance passed over by vehicles, also applicable to machinery and other similar purposes.

Dated 27th April, 1863.

1057. A. Rollason, East Peckham, Surrey—Imp. in dyeing and staining fabrics, parts of which imp. are also applicable for dyeing, staining, and ornamenting glass and other substances.

Dated 5th May, 1863.

1121. F. Applegate, Bradford-on-Avon, Wiltshire—Imp. in stopping and starting railway trains.

Dated 6th May, 1863.

1137. A. V. Newton, 66, Chancery-lane—Imp. in sewing machines. (A com.)

Dated 7th May, 1863.

1139. J. Snider, jun., Dorset-street—Imp. in breech-loading fire-arms and ordnance.
1141. J. Walker, Compstall-bridge, near Stockport—Imp. in the construction of mechanism applicable to looms, and partly to carding engines and other machinery.
1145. J. Bettridge, Birmingham—Imp. in the ornamentation of papier mache and other japanned wares, wood, ivory, and other similar materials.

1147. J. B. P. A. Thierry, 91, Rue des Marais, St. Martin, Paris—Imp. in the arrangement or construction of furnaces to render the combustion of fuel more complete, and to prevent the emission of smoke therefrom.

Dated 8th May, 1863.

1149. P. J. Livsey, Manchester—Imp. in compound steam engines. (A com.)
1153. C. L. Braithwaite and J. Hirst, Westmorland—Imp. in machinery for feeding slivers of wool and other material to carding engines.
1155. J. C. Droop, Schwelm, Prussia—An instrument or holder for holding nails, screws, or other fastenings.
1159. G. T. Bousfield, Loughborough-park, Brixton—Imp. in steam engines. (A com.)

Dated 9th May, 1863.

1160. W. Thomson, Coatbride, Glasgow—Imp. in obtaining motive power, which imp. are applicable in part for raising or forcing fluids into steam boilers, tanks, and other vessels.
1161. J. Strickland, 25½, Gee street, St. Luke s — Imp. in laying veneers on to surfaces, in applying the glue for that purpose, and in the apparatus employed.
1165. J. Page and A. T. Wayne, Birmingham—An imp. or imps. in the manufacture of pens.
1166. J. Brierley, Denby Dale, near Huddersfield—Imp. in dyeing knickerbocker yarns and textile fabrics manufactured of or from such yarns.
1167. W. Boaler, 85, Piccadilly, Manchester—An improved dryer fabric for paper making.
1171. J. B. Wood, M.D., Vernon house, Camp-street, Broughton, near Manchester—Imp. applicable to the defending of ships or vessels and forts when armour plating is employed.
1173. C. H. G. Williams, Burnford-street, Glasgow—Imp. in the manufacture of colouring matters.

Dated 11th May, 1863.

1177. B. Hargreaves, Arden-house, near Accrington, Lancashire—Imp. in tiles for drainage or sanatory purposes.
1179. C. Shorrock and W. Shorrock, Over Darwen, Lancashire—Certain imp. in power looms for weaving.
1183. R. A. Brooman, 166, Fleet-street—Imp. in coupling and disconnecting carriages on railways, and in machinery employed therein. (A com.)
1184. J. S. Guirette, Paris—An imp. in inhaling apparatuses.
1186. J. E. McConnell, Dean's yard, Westminster, and G. H. Bovills Durnsford-lodge, near Wandsworth, Surrey—Imp. in chain, for cables and other purposes.

Dated 12th May, 1863.

1187. B. Lilley, Birmingham—Imp. in the construction of "snap caps" or "nipple protectors" for fire-arms.
1189. T. Warren, Glasgow—Imp. in glass and other furnaces or kilns.
1191. J. E. McConnell, Dean's yard, Westminster, and C. H. Bovill, Durnsford lodge, near Wandsworth, Surrey—Imp. in treating worn out railway tyres.
1193. G. A. Huddart, Brynkir, Carnarvonshire—Improved apparatus for cutting slate.
1195. R. A. Brooman, 166, Fleet-street—Imp. in spring mattresses. (A com.)

Dated 13th May, 1863.

1199. R. A. Brooman, 166, Fleet street—Imp. in laying submarine telegraph cables. (A com.)
1201. T. Parkinson and F. Taylor, Blackburn—Imp. in machinery for weaving, sizing, dressing, and dyeing.
1203. J. E. McConnell, Dean's-yard, Westminster, and G. H. Bovill, Durnsford-lodge, near Wandsworth, Surrey—Imp. in the manufacture of thick plates of wrought iron for armour plates and other purposes.
1205. C. L. Kensner, East Greenwich, Kent—Imp. in the manufacture of hydrate of barytes, and in the manufacture of sugar.
1207. A. G. Southby, Bulford, Wiltshire—Imp. in railway roof lamps, station, signal, and other fountain lamps.
1208. J. Farmer, Salford—Imp. in calendering, embossing, and other such machines used for finishing woven fabrics, part of which imp. is also applicable to drying machines.
1209. R. A. Brooman, 166, Fleet-street—Imp. in the extraction of hydro-carburets from minerals, in the distillation thereof, and in the apparatus employed therein. (A com.)

Dated 14th May, 1863.

1211. J. Satchwell, W. H. Ashford, and C. Harrison, Birmingham—Imp. in nails or rivets for boots and shoes, applicable to other purposes.
1213. J. T. King, Liverpool—Imp. in wicks for oil and other fluid burning lamps. (A com.)
1215. G. Dowler, Birmingham—An imp. or imps. in match boxes.
1217. F. K. Erlam, Devonshire-terrace, Fulham-road—A new lubricating material or compound.
1219. I. Parker, Haughton-street, Clare Market—Imp. in connecting and securing door and other knobs or handles to their spindles.

Dated 15th May, 1863.

1220. B. Shillito and D. Moor, 51, High-street, Kingston-upon Hull—Imp. in generating heat and motive power.
1221. D. M. Fyfe, Maidenhead, Berkshire—Imp. in the brushes, instruments, or apparatus employed for painting the centres and bulls-eyes of military or other targets.
1222. D. M. Fyfe, Maidenhead—Imp. in the means or apparatus employed for raising, removing, transporting, and refixing military or other targets or mantlets.
1223. W. Clark, 53, Chancery-lane—Imp. in repeating fire-arms. (A com.)
1224. A. Macmillan, 17, King's-road, Ball's-pond-road, Islington—Imp. in buttons and in fastening buttons to garments.
1227. J. Papin, C. Lintz, and L. Lavacherie, Paris, Rue Feydeau, No. 28—Imp. in the manufacture of boots and shoes.

Invention with Complete Specification Filed.

1282. W. Snell, 16, Clement's-inn, Westminster—Imp. in butt hinges. (A com.)—22nd May, 1863.

Patents Sealed.

[*From Gazette, May 29th*, 1863.]

May 27th.

3191. J. Cresswell & E. T. Greves.
3192. S. J. Browning.
3194. W. Buller & J. H. Mugford.
3196. J. Adams and W. C. White.
3197. A. Dudgeon.
3200. F. G. Taylor.
3206. J. C. Robertson and W. C. White.
3211. M. Henry.
3212. H. L. Emery.
3214. G. F. Griffin.
3215. T Waller.
3217. R. Flude.
3219. J. Romer.
3230. G. F. Blumberg.
3231. J. Wheatley.
3236. A. P. Charles.
3260. T. G. Webb.
3279. R. E. Donovan.
3287. G. A. Huddart.
3306. J. Lamb.
3312. A. P. Price.
3315. W. Clark.
3319. W. Tristam & H. Brereton.
3321. R. A. Ronald.
3344. M. Henry.
3349. W. Phelps.
3384. J. Clayton.
3401. J. Dalton.
3432. G. H. Birkbeck.
84. M. Henry.
110. C. E. Amos.
417. W. C. McEntee, G. Withers, and T. Withers.
688. W. Smith.
738. J. Saunders and J. Piper.
739. S. L. Crocker.
852. G. A. Cox.

[*From Gazette, June 2nd*, 1863.]

June 2nd.

3232. T. Cook.
3243. C. F. Claus.
3252. J Braddock.
3256. J. Robinson.
3258. R. Wallis.
3262. L. Christoph, W. Hawksworth, & G. P. Harding.
3263. E. B. Wilson.
3267. W. J. Smith.
3272. J. Craig and M. Craig.
3273. G. Wright.
3274. W. McNaught.
3281. W Palliser.
3284. J. Sellars.
3288. C. Sanderson.
3290. J. Hilliar.
3291. J. Hilliar.
3292. E. T. Hughes.
3295. T. Wingate, jun.
3296. V. Mirland.
3200. G. Jeffries.
3303. P. Effertz.
3304. W. E. Newton.
3316. J. King.
3320. J. R. Breckon and T. Douglas.
3323. A. W. Burgess.
3324. J. Imray.
3325. W. Goulding.
3329. J. E. Roussel.
3334. S. Fox.
3348. G. Buchanan.
3365. R. Hattersley.
3446. J. H. Johnson.
3469. W. Billinghurst and J. Requa.
196. J. Grant.
880. J. Howard, E. T. Bousfield, and J. Pinney.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, June 2nd*, 1863.]

May 18th.

1228. H. N. Nissen.
1290. J. Paddon and W. Lowther.
1299. G. Wallis.
1348. C. Clay.
1393. J. Saunders and J. Piper.

May 19th.

1247. J. Craig.
1253. G. Moulton.

May 20th.

1255. J. Green.

May 21st.

1264. J. Paton.
1288. W. Baker.
1289. W. E. Newton.
1307. J. Dale and H. Caro.

May 22nd.

1272. M. Cavanagh.
1295. J. Macintosh.
1303. G. Elliot.

May 23rd.

1286. T. Johnson.
1291. F. W. Prince.
1426. F. G. Calvert, C. Lowe, and S. Clift.

May 27th.

1306. G. Dowler & G. J. Farmer.
1313. J. H. Johnson.
1314. W. Tasker.
1316. Rev. H. Moule and J. Bannehr.
1328. A. J. Paterson.
1347. W. H. Harfield.

May 28th.

1308. S. Chatwood.

May 29th.

1336. W. E. Newton.
1573. J. Whitehouse.

May 30th.

1337. W. R. Bowditch.
1343. J. A. Manning.
1356. W. Stratford.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, June 2nd*, 1863.]

May 18th.

1226. R. Bell.
1255. C. Cowper.

May 19th.

1206. A. Allan and T. Hunt.
1254. W. Hulse.

May 21st.

1291. R. Jobson.
1292. H. Bessemer.

May 23rd.

1250. B. N. de Buffon.
1252. A. R. le Mire de Normandy.

May 27th.

1270. L. D. Owen.

May 28th.

1288. W. Needham and J. Kite.

May 29th.

1297. H. Cartwright.

May 30th.

1315. E. Heywood and T. O. Dixon.

Journal of the Society of Arts.

FRIDAY, JUNE 12, 1863.

WOOD CARVING.

The Exhibition of specimens sent in competition for the prizes offered by the Society of Arts and the Society of Wood-Carvers, as well as of other specimens of wood-carving, is now open to members and their friends, and to members of the Society of Wood Carvers and their friends. A sheet of tickets is issued with this day's *Journal;* additional tickets may be had on application to the Secretary. The awards of the Judges will shortly be published.

ANNUAL DINNER.

The One Hundred-and-Ninth Anniversary Dinner of the members and their friends will take place at St. James's Hall, Piccadilly, on Saturday, the 20th inst., at Six o'clock punctually. The Solicitor-General, Sir Roundell Palmer, M.P., will preside.

Applications for tickets (price One Guinea each) should be made to the Financial Officer, at the Society's House. Members desiring to have seats reserved for themselves and their friends, must take their tickets not later than Wednesday, the 17th inst.

TWELFTH ANNUAL CONFERENCE.—NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The Twelfth Annual Conference of the Representatives of the Institutions in Union and the Local Educational Boards with the Council will be held this day, Friday, the 12th June, at Twelve o'clock, noon. Sir Thomas Phillips, F.G.S., Chairman of the Council, will preside.

INAUGURATION OF THE MEMORIAL OF THE EXHIBITION OF 1851.

On Wednesday afternoon, the 10th inst., the inauguration of the Memorial in commemoration of the Great Exhibition of 1851, at the Royal Horticultural Gardens, took place.

The Vice-Presidents, Members of the Council, and Officers of the Society of Arts, took part in the proceedings.

Their Royal Highnesses the Prince and Princess of Wales, accompanied by the Prince Alfred, the Princess Helena, the Princess Louisa, the Prince Arthur, and the Prince Leopold, with their suite, arrived at the Western Dome of the International Exhibition building at 4 o'clock. Their Royal Highnesses the Duke of Cambridge, the Duchess of Cambridge, and the Princess Mary, were also present.

An address was then presented to the Prince of Wales by the Duke of Buccleugh, as President of the Royal Horticultural Society.

A procession was then formed in the following order:—

Trumpeters.
Mr. George Eyles, the Superintendent of the Horticultural Gardens.
The Sculptor, Mr. Joseph Durham.
Memorial Committee.
Mayors, Provosts, and Chief Magistrates of those Cities and Towns which in 1851 formed Local Committees.
Lord Provost of Perth, The Lord Mayor of York,
Lord Provost of Glasgow, Lord Mayor of Dublin, and Lord Provost of Edinburgh.
The Sheriffs of London and Middlesex.
Lord Mayor of London.
Council of the Society of Arts.
Presidents of Societies of which H.R.H. the Prince Consort was a Member.
Members of Works and Fine Arts Committees.
Her Majesty's Commissioners for the Exhibitions of 1851 and 1862.
The Household of H.R.H. the Prince Consort.
Corps Diplomatique.
Viscount Palmerston, K.G., and other Members of Her Majesty's Government and Household.
Council of the Royal Horticultural Society.
Executive Committee of the Memorial Committee.
Their RR.HH.'s the Prince and Princess of Wales.
Members of the Royal Family.
The Respective Suites.

The procession then proceeded to a temporary balcony, overlooking the Gardens, where an address from the Memorial Committee was read by Mr. George Godwin, F.R.S., Honorary Secretary, to which His Royal Highness read a reply.

His Royal Highness then directed the uncovering of the Memorial, which was announced by a flourish of trumpets and a salute of artillery.

The procession then reformed and proceeded round the Gardens, and the Royal Party, after inspecting the Memorial, took their departure.

The inscriptions on the monument include the names of the Commissioners of the Exhibition of 1851, headed by that of the Prince Consort, as President of the Commission; a list of the exhibiting countries; the statistics of the Exhibition, with names of the architect and the contractors; the names of the Executive Committee of the Memorial; and a dedication as follows:—

Erected
By Public Subscription.
Originally intended only to Commemorate
The International Exhibition of 1851,
Now Dedicated also to the Memory of
The Great Author of that Undertaking,
The Good Prince,
To whose far seeing and comprehensive philanthropy
Its first conception was due;
And to whose clear judgment and untiring exertions
In directing its execution
The world is indebted for
Its unprecedented success.
ALBERT FRANCIS AUGUSTUS CHARLES EMANUEL,
The Prince Consort.
Born August 26, 1819. Died December 14, 1861.
"He was a man! take him for all in all,
We shall not look upon his like again."
Sculptor—Joseph Durham.

EXAMINATIONS, 1863.

PRIZES AND CERTIFICATES AWARDED TO CANDIDATES.

PRIZES.

His Royal Highness the Prince Consort's Prize of Twenty-five Guineas, to

595. William Vaughan, aged 22, City of London College—Clerk, who has obtained the following First Class Certificates :—

1860. Arithmetic—First-class Certificate.
1861. Geometry—First-class Certificate.
1862. Book-keeping—First-class Certificate.
,, Mensuration—First-class Certificate.
1863. Algebra—First-class Certificate (with First Prize).
,, Trigonometry—First-class Certificate (with First Prize).
,, Conic Sections—First-class Certificate (with First Prize).

Arithmetic	1st Prize	£5	To No. 169—John Allan, aged 24, Glasgow Athenæum—Clerk
	2nd Prize	3	,, 714—John Simon Cleland, aged 19, Glasgow Institution—Queen's Scholar
Book-keeping	1st Prize	5	,, 169—John Allan, aged 24, Glasgow Athenæum—Clerk
	2nd Prize	3	,, 562—Bentley McLeod, aged 20, City of London College—Bill and Discount Broker
Algebra	1st Prize	5	,, 595—William Vaughan, aged 22, City of London College—Clerk
	2nd Prize	3	,, 303—Robert Archer Furbank, aged 18, Leeds Young Men's Christian Association—Clerk
Geometry	1st Prize	5	,, 143—William James Fitze, aged 18, Devonport Mechanics' Institute—Shipwright's Apprentice
	2nd Prize	3	,, 144—Henry George White, aged 21, Devonport Mechanics' Institute—Shipwright
Mensuration		...	*No Prizes Awarded.**
Trigonometry	1st Prize	5	,, 595—William Vaughan, aged 22, City of London College—Clerk
	...	...	*No Second Prize Awarded.†*
Conic Sections	1st Prize	5	,, 595—William Vaughan, aged 22, City of London College—Clerk
	...	...	*No Second Prize Awarded.†*
Navigation & Nautical Astronomy	...	..	*No Prizes Awarded.**
Principles of Mechanics	1st Prize	5	,, 658—James Dickson, aged 24, Popular Evening Classes, Andersonian University, Glasgow—Clerk
	...	...	*No Second Prize Awarded.†*
Practical Mechanics	1st Prize	5	,, 993—William Dean, aged 23, Wolverhampton Working Men's College—Railway Clerk
	2nd Prize	3	,, 327—Henry Bramall, aged 25, Liverpool Institute—Mining Agent
Electricity, Magnetism, and Heat	1st Prize	5	,, 314—William Crosher, aged 25, Leicester Church of England Institute—Hosier
	2nd Prize	3	,, 691—John Henderson, aged 36, Popular Evening Classes, Andersonian University, Glasgow—Letter-press Printer
Astronomy		...	*No Prizes Awarded.**
Chemistry	1st Prize	5	,, 904—Charles Blakemore Hodgetts, aged 28, Cradley Night School—Blast-furnace Manager
	2nd Prize	3	,, 621—William Henry Griffith, aged 20, Bristol Trade and Mining School—Chemist and Druggist
Animal Physiology, in relation to health	1st Prize	5	,, 790—Thomas Carleton Railton, Manchester Mechanics' Institute—Town Traveller
	2nd Prize	3	,, 824—Frederic Atmore Winkfield, aged 20, Manchester Mechanics' Institute—Valuer's Assistant
	3rd Prize‡	2	,, 685—George Norval, aged 38, Popular Evening Classes, Andersonian University, Glasgow—Pattern Card Maker
	Two Prizes of Books to the value of £1 each§	1	,, 971—Frederick Yates, aged 25, Wolverhampton Young Men's Christian Institution—Clerk
		1	,, 1058—William Barr, aged 19, Glasgow Mechanics' Institution—Clerk
Botany		...	*No Prizes Awarded.**
Agriculture		...	*No Prizes Awarded.**
Mining and Metallurgy‖	1st Prize	5	,, 327—Henry Bramall, aged 25, Liverpool Institute—Mining Agent
	2nd Prize	3	,, 655—James Radcliffe, aged 23, Popular Evening Classes, Andersonian University, Glasgow—Miner

* No Candidate obtained a First-class Certificate in this subject.
† The Candidate standing second in this subject did not obtain a First-class Certificate.
‡ Additional, by gift of Harry Chester, Esq.
§ The Third Prize of Books in this subject is not awarded, as no other Candidate obtained a First-class Certificate.
‖ The Additional Prizes are not awarded, as no more Candidates obtained First-class Certificates.

Subject	Prize	£	Awarded
Political & Social Economy	1st Prize	£5	To No. 590—James Rigby Smith, aged 22, City of London College—Bootmaker
	...	...	*No Second Prize Awarded.**
Domestic Economy	1st Prize	5	,, 35—Thomas Nesbit, aged 28, South-Eastern Railway Mechanics' Institution—Railway Clerk
	...	...	*No Second Prize Awarded.**
Geography	1st Prize	5	,, 33—Henry Kearns, aged 16, Aldershot Institute—Clerk
	2nd Prize	3	,, 169—John Allan, aged 24, Glasgow Athenæum—Clerk
English History	1st Prize	5	,, 574—George M. Norris, aged 21, City of London College—Clerk
	2nd Prize	3	,, 636—John Grieveson, aged 30, Darlington Church Institute—Railway Agent
	3rd Prize†	2	,, —Peter Urquhart, aged 20, Aberdeen Mechanics' Institute—Clerk
	Three Prizes† of Books to the amount of £1 each	1	,, 138—Charles Jones Ellis, aged 24, Devonport Mechanics' Institute—Shipwright
		1	,, 470—George Pearson, aged 18, Scarborough Mechanics' Institution—Clerk
		1	,, 559—William George Masham, aged 22, City of London College—Commercial Clerk
English Literature	1st Prize	5	,, 1026—Walter Slater, aged 22, London Mechanics' Institution—Clerk
	2nd Prize	3	,, 255—James Broadbent, aged 21, Leeds Church Institute—Warehouseman
	3rd Prize†	2	,, 670—James David Hedderwick, aged 17, Popular Evening Classes, Andersonian University, Glasgow—Clerk
	Three Prizes† of Books to the amount of £1 each	1	,, 170—James Bennie, aged 28, Glasgow Athenæum—Clerk
		1	,, 537—Joseph Seed Roberts, aged 22, York Institute—Cabinet-maker.
		1	,, 549—Henry William Baker, aged 22, City of London College—Clerk
Logic & Mental Science	1st Prize	5	,, 1025—Stephen Henry Emmens, aged 19, London Mechanics' Institution—Clerk in Church of England Assurance Company
	2nd Prize	3	,, 1022—James Sutherland Simon, aged 27, London Mechanics' Institution—Clerk
Latin and Roman History	1st Prize	5	,, 1026—Walter Slater, aged 22, London Mechanics' Institution—Clerk
	...	...	*No Second Prize Awarded.**
French	1st Prize	5	,, 582—Arthur Richard Brewer, aged 18, City of London College—Clerk
	2nd Prize	3	,, 777—Maria Cecilia Albin, aged 23, Polytechnic Institution
German	1st Prize	5	,, 162—Hugh Dunbar McMaster, aged 19, Gilford (Ireland) Young Men's Mutual Improvement Society—Clerk
	...	...	*No Second Prize Awarded.**
Free-hand Drawing	1st Prize	5	,, 704—Hamilton McMillan, aged 26, Glasgow Institution—Wood Carver
	2nd Prize	3	,, 1104—Harry Penn, aged 19, Hitchin Mechanics' Institution—Draper
Geometrical Drawing	1st Prize	5	,, 142—George James Rickard, aged 19, Devonport Mechanics' Institute—Shipwright
	...	...	*No Second Prize Awarded.**
Music	1st Prize	5	,, 529—James Smalley, aged 46, Wigan Mechanics' Institute—Tailor and Draper
	2nd Prize	3	,, 739—Joseph Whitaker, aged 28, Halifax Mechanics' Institution—Clerk

* The Candidate standing second in this subject did not obtain a First-class Certificate.
† Additional, by gift of Sir C. Wentworth Dilke, Bart.

CERTIFICATES.

The following is an Alphabetical List of the Candidates who have obtained Certificates :—

(1st) after a subject signifies a First-class Certificate.
(2nd) ,, ,, Second-class ,,
(3rd) ,, ,, Third-class ,,
(The occupations stated are either present or proposed.)

No.
10—Abercromby, Andrew, aged 19, Aberdeen M.I., Clerk—Arithmetic (2nd); Algebra (3rd)
870—Ackroyd, William, aged 23, Oldham Science School, Mechanic—Geometrical Drawing (3rd)
796—Adams, Alfred, aged 17, Manchester M.I., Yarn Packer—Book-keeping (2nd)
317—Adcock, Edmund, aged 17, Leicester Church of England Inst., Pupil Teacher—Arithmetic (2nd)
699—Aikin, John, aged 23, Glasgow Inst., Inland Revenue Officer—Arithmetic (2nd); Book-keeping (2nd); Geography (2nd)
651—Aitken, William, aged 21, Popular Evening Classes, Andersonian University, Glasgow, Miner—Mining and Metallurgy (3rd)
*777—Albin, Juliette, aged 26, Polytechnic Inst.—French (2nd)
777—Albin, Maria Cecilia, aged 23, Polytechnic Inst.—French (1st); with 2nd Prize.
169—Allan, John, aged 24, Glasgow Athenæum, Clerk—Arithmetic (1st), with 1st Prize; Book-keeping (1st), with 1st Prize; Geography (1st), with 2nd Prize.

1082—Allan, Robert, aged 32, Glasgow M.I., Clerk—Logic and Mental Science (3rd)
140—Allen, George Edward, aged 23, Devonport M.I., Accountant—Free-hand Drawing (2nd)
1069—Allerüp, Emil, aged 22, Glasgow M.I., Clerk—Book-keeping (1st)
1080—Anderson, James, aged 25, Glasgow M.I., Clerk—Geometry (1st)
711—Anderson, Thomas, aged 20, Glasgow Inst.—Algebra (3rd); Geometry (2nd)
826—Andrew, Samuel Alltree, aged 21, Manchester M.I., Clerk—Book-keeping (2nd)
545—Andrewes, Thomas Lloyd Newton, aged 22, City of London College, Mercantile Clerk—Arithmetic (3rd)
836—Andrews, James, aged 22, Manchester M.I., Warehouseman—French (3rd)
990—Andrews, John Samuel, aged 19, Wolverhampton W.M. Coll., Railway Clerk—Arithmetic (2nd)
1021—Annington, Joseph William, aged 16, Burnley M.I., Druggist—Chemistry (1st)
548—Appleyard, Charles Henry, aged 26, City of London College, Clerk and Commercial Traveller—French (2nd)
374—Appleyard Isaac, aged 19, Middlesbro' M.I., Teacher—Arithmetic (1st); Chemistry (3rd); Mensuration (3rd)
295—Appleyard, William Holliday, aged 20, Leeds Young Men's Christian Association, Teacher—Book-keeping (1st)
66—Archer, Albert Monteith, aged 16, Banbridge Lit. and Mut. Imp. Soc., Clerk—English History (2nd)
522—Archer, Caleb, aged 22, Wellingborough M.I., Architect's Clerk—Mensuration (2nd)
*244—Ardill, Fanny, aged 18, Ladies' Educational Inst., Leeds, Pupil Teacher—Arithmetic (3rd)
1012—Aspden, Joseph, aged 17, Burnley M.I., Weaver—Arithmetic (3rd)
273—Athron, Joseph, aged 24, Leeds M.I., Architect's Pupil—Free-hand Drawing (2nd).
613—Atkins, Alfred Hodgetts, aged 16, Birmingham and Midland Inst., Pupil Teacher—Geometry (3rd)
74—Atlee, Thomas, aged 28, Banbury M.I., Commercial Clerk—Book-keeping (3rd)
883—Aubrey, William Davis, aged 26, Southampton Athenæum, Schoolmaster—Arithmetic (3rd)
153—Bagley, William Frederick Gilbert, aged 21, Devonport M.I., Conveyancer's Clerk—Arithmetic (3rd)
135—Bailey, William Heap, aged 18, Derby M.I., Warehouseman—Book-keeping (2nd)
172—Baird, James, aged 16, Glasgow Athenæum, in a Merchant's Office—French (3rd)
549—Baker, Henry William, aged 22, City of London College, Clerk—English History (1st); English Literature (1st); with Prize of Books to the amount of £1; Latin and Roman History (2nd)
347—Baker, William Henry, aged 19, St. Stephen's Evening Schools, Schoolmaster—Music (2nd); Algebra (2nd)
560—Bakewell, Armytage, aged 22, City of London College, Clerk—Book-keeping (2nd)
90—Baldwin, Bentley, aged 21, Bradford M.I., Warehouseman—Arithmetic (2nd); English History (3rd)
768—Balme, Henry, aged 23, Halifax W.M. Coll., Woolsorter—English Literature (3rd)
*621—Barber, John, aged 35, Bristol Trade School, Druggist's Assistant—Chemistry (2nd)
754—Barbour, Samuel James, aged 19, Halifax W.M. Coll., Book-keeper—Book-keeping (2nd)
102—Barker, Albert, aged 17, Bradford M.I., Warehouseman—Arithmetic (1st); Book-keeping (3rd)
432—Barley, James, aged 18, Peterborough M.I., Pupil Teacher—Arithmetic (3rd); English History (3rd); Geography (2nd)
814—Barlow, Samuel, aged 19, Manchester M.I., Clerk—English History (3rd); Geography (3rd)
173—Barr, Robert, junr., aged 18, Glasgow Athenæum, Mercantile Clerk—French (3rd)
1058—Barr, William, aged 18, Glasgow M.I., Clerk—Chemistry (1st); Animal Physiology (1st), with Prize of books to the amount of £1.
430—Barnes, John Frederick, aged 17, Pembroke Dock M.I., Pupil Teacher—Arithmetic (2nd)
326—Barrow, James Henry, aged 16, Liverpool Institute, Pupil-teacher—Arithmetic (2nd); Algebra (2nd); Geometry (2nd)
653—Barrowman, William, aged 17, Popular Evening Classes, Andersonian University, Glasgow, Studying Colliery Management—Mining and Metallurgy (2nd)
136—Bassano, Henry, aged 22, Derby M.I., Whitesmith—Book-keeping (3rd)
935—Bate, John, aged 22, Stourbridge M.I., Bricklayer—Arithmetic (1st); Algebra (2nd); Geometry (2nd)
703—Bathgate, George, aged 22, Glasgow Inst., Wood Carver—Freehand Drawing (3rd)
243—Batley, Henry Gurson, aged 18, Ipswich W.M.C., Clerk—Arithmetic (1st); Book-keeping (1st)
994—Battle, Hugh, aged 43, Wolverhampton W.M.C., Missionary—Navigation and Nautical Astronomy (2nd); Principles of Mechanics (3rd)
50—Baxter, John, aged 28, Bacup M.I., Clerk—Book-keeping (3rd)
564—Bayfield, Gabriel Alphonsus, aged 20, City of London College, Clerk—Book-keeping (2nd)
1038—Beard, Elizabeth Mary, aged 39, London M.I., Governess—French (3rd)
1037—Beard, Fanny, aged 33, London M.I., Governess—French (1st); German (2nd)
100—Bearder, George, aged 29, Bradford M.I., Teacher—Arithmetic (3rd); Book-keeping (2nd); Algebra (3rd); Mensuration (3rd)
73—Beesley, Thomas, jun., aged 16, Banbury M.I., Pharmaceutical Pupil—Chemistry (2nd); Algebra (3rd); Latin and Roman History (3rd)
234—Belcher, Joseph, aged 23, Ipswich W.M.C., Attorney's Clerk—Arithmetic (2nd); Book-keeping (2nd)
174—Bell, Dugald, aged 35, Glasgow Athenæum, Book-keeper and Cashier—French (1st)
101—Bell, Foster, aged 17, Bradford M.I., Warehouseman—Book-keeping (3rd)
566—Bellot, Henry C., aged 18, City of London College, Clerk—Book-keeping (2nd); French (2nd)
170—Bennie, James, aged 28, Glasgow Athenæum, Clerk—English Literature (1st), with Prize of Books to the value of £1
616—Betts, Walter William, aged 20, Birmingham and Midland Inst., Clerk—Arithmetic (1st)
118—Bewers, William, aged 19, Chelmsford L. and M.I., Corn-merchant's Clerk—Geography (3rd)
622—Beynon, Erasmus, aged 20, Bristol Trade and Mining School, Chemists and Druggists' Assistant—Chemistry (1st)
469—Bird, Samuel Robert, aged 16, Scarborough M.I., Clerk — English History (2nd); Geography (2nd); French (3rd)
722—Black, Alexander, aged 16, Glasgow Inst., Pupil Teacher—Geography (2nd)
712—Black, John, aged 17, Glasgow Inst., Warehouseman—Arithmetic (2nd); Geometry (2nd); Algebra (3rd)
171—Black, William, aged 21, Glasgow Athenæum, Clerk—Latin and Roman History (2nd)
862—Blackstock, Thomas, aged 42, Oldham Science School, Mechanic—Geometrical Drawing (3rd)
538—Blanshard, William Noble, aged 18, York Institute, Attorney's Clerk—Arithmetic (2nd); Book-keeping (2nd)
798—Bleakley, Reuben, aged 19, Manchester M.I., Assistant Teacher—Book-keeping (2nd)

237—Bloomfield, David, aged 20, Ipswich W.M. Col., Commercial Clerk—Book-keeping (1st)
1044—Board, Baruch, aged 16, Night School, Lyme Regis, Pupil Teacher—Arithmetic (3rd); Domestic Economy (3rd); Geography (3rd)
928—Boden, George, aged 22, Church of England Young Men's Association, Stourbridge, Reporter—French (2nd)
751—Bolton, James, aged 16, Halifax W.M. Col., Clerk—Arithmetic (2nd)
659—Bone, Charles Christison, aged 24, Popular Evening Classes, Andersonian University, Glasgow, Clerk—Geometry (3rd)
893—Bone, William, aged 25, Southampton Athenæum, Clerk—Book-keeping (1st)
146—Bone, William John, aged 19, Devonport M.I., Shipwright's Apprentice—Algebra (1st); Trigonometry (2nd)
397—Booth, George, aged 22, Lees Lit. and S.I., Book-keeper—Arithmetic (2nd); Book-keeping (2nd)
*742—Booth, Montague, aged 30, Harrison-road Young Men's Society, Halifax, Woolsorter—Book-keeping (2nd)
20—Booth, William, aged 16, Aberdeen M.I., Clerk—Book-keeping (3rd)
389—Bottomley, Richard Oastler, aged 19, Oldham Lyceum, Warehouseman—Free-hand Drawing (3rd)
576—Bowman, Kenneth S., aged 17, City of London College, Civil Service—English History (2nd); French (3rd)
275—Bradbury, Alfred Allen, aged 17, Leeds School of Art, Art Student—Free-hand Drawing (2nd)
594—Brain, Herbert, aged 22, City of London College, Cashier—French (1st)
1106—Braithwaite, Stansfield, aged 18, Idle M.I., Clothier—Arithmetic (2nd); Book-keeping (3rd)
327—Bramall, Henry, aged 25, Liverpool Inst., Mining Agent—Mining and Metallurgy (1st), with 1st Prize; Practical Mechanics (1st), with 2nd Prize; Principles of Mechanics (2nd)
855—Bramall, William E., aged 19, Oldham Science School, Draughtsman—Geometrical Drawing (3rd)
830—Bramall, William Henry, aged 17, Manchester M.I., Brass Finisher—Geometrical Drawing (3rd)
498—Bramhall, John, aged 24, People's College, Sheffield, Usher—Arithmetic (3rd)
769—Brear, William, aged 19, Halifax W.M. Coll., Warehouseman—Political and Social Economy (3rd)
582—Brewer, Arthur Richard, aged 18, City of London College, Clerk—French (1st), with 1st Prize
233—Brewster, Richard George, aged 17, Ipswich Working Men's Coll., Pupil Teacher—Arithmetic (1st)
225—Briden, Thomas, aged 21, Hertford Literary and Scientific Inst., Baker—Arithmetic (2nd)
606—Bridge, John, aged 20, Accrington M.I., Weaver—Chemistry (3rd)
384—Brierley, Samuel, aged 22, Oldham Lyceum, Mechanic—Free-hand Drawing (3rd)
*740—Briggs, James, aged 37, Halifax, schoolmaster—Arithmetic (1st); Book-keeping (2nd)
254—Briggs, William, aged 18, Leeds M.I., Assistant at the Mech. Inst., Leeds—Geography (2nd); English History (3rd)
255—Broadbent, James, aged 21, Leeds Church Inst., Warehouseman—English Literature (1st) with 2nd Prize; English History (3rd); Geography (2nd)
745—Broadbent, Michael, aged 27, Halifax W.M. Coll., Weaver—Chemistry (3rd)
1034—Brosnahan, William, aged 27, London M.I., Inland Revenue—Chemistry (1st); Logic and Mental Science (2nd)
151—Brown, Charles Gilbert, aged 17, Devonport School of Art, Pupil Teacher—Freehand Drawing (3rd)
998—Brown, David, aged 24, Willenhall L.I., Colliery Clerk—Arithmetic (2nd)
778—Brown, Edward, aged 19, Polytechnic Inst., Builder—Book-keeping (2nd)
1041—Brown, Frederick, aged 32, London M.I., Clerk—Arithmetic (2nd); Book-keeping (2nd)
*1020-Brown, Robert, aged 21, Burnley M.I.—Chemistry (1st); Electricity, Magnetism, and Heat (2nd)
1011—Broxup, James, aged 21, Burnley M.I., Mechanic—Chemistry (1st); Practical Mechanics (2nd)
214—Bryett, Thomas, aged 18—Gosport and Alverstoke L. and S. I., Attorney's Clerk—Arithmetic (2nd); Book-keeping (2nd)
724—Buchanan, Alexander, aged 18, Glasgow Inst., Clerk—Book-keeping (2nd)
167—Buchanan, Janet, aged 19, Evening Science Classes, Secular School, Glasgow—Animal Physiology (3rd)
1057—Buchanan, William, aged 17, Glasgow M.I., Clerk—German (3rd)
457—Buckley, Edwin, aged 16, Salford W.M. Coll., Pupil Teacher—Arithmetic (3rd)
16—Bulloch, William, aged 21, Aberdeen M.I., Clerk—English History (2nd)
76—Burbidge, George F., aged 17, Banbury M.I., Clerk—Arithmetic (3rd)
917—Burden, William Henry, aged 19, Messrs. Chance's Library, Clerk—Algebra (1st)
981—Butler, James Henry, aged 21, Wolverhampton W.M. Col., Presser and Stamper—Chemistry (3rd); Mensuration (3rd)
368—Burgess, Martha, aged 38, Macclesfield Useful Knowledge Society, Housekeeper—Domestic Economy (3rd); French (3rd)
401—Butterworth, Thomas, aged 32, Oldham Lyceum, Mechanic—Geometrical Drawing (2nd)
1054—Buyers, William, aged 18, Glasgow M.I., Marine Engineer—Practical Mechanics (3rd)
808—Cadley, George, aged 20, Manchester M.I., Boot closer—English History (3rd)
743—Cain, Thomas, aged 27, Halifax M.I., Card maker—Music (2nd)
675—Caldwell, James, aged 21, Popular Evening Classes, Andersonian University, Glasgow, Engineer—Practical Mechanics (3rd); Free-hand Drawing (3rd)
856—Campbell, Iver, aged 28, Oldham Science School, Wood Turner—Geometrical Drawing (3rd)
642—Campbell, Nicholas, aged 19, Popular Evening Classes, Andersonian University, Glasgow—Studying Colliery Management—Mining and Metallurgy (3rd)
328—Carroll, Alfred, aged 16, Liverpool Inst.—Arithmetic (2nd); Algebra (2nd); Geometry (1st)
583—Carter, Thomas Charles, aged 18, City of London College, Clerk—Arithmetic (3rd)
956—Cartwright, Enoch, aged 25, Wednesbury M.I., Commercial Clerk—French (2nd)
1000—Cartwright, Samuel, aged 32, Willenhall Lit. Inst., Bootmaker—Logic and Mental Science (1st)
744—Cash, William, aged 19, Halifax M.I., Banker's Clerk—French (2nd)
321—Cave, Thomas, aged 20, Leicester Church of England Inst., Cabinetmaker's Apprentice—Geography (3rd); English History (3rd)
936—Cave, William, Jun., aged 19, Stourbridge M.I., Clerk—Arithmetic (2nd); Geography (2nd); English History (3rd)
133—Cearns, John Frederick, aged 17, Shipwright Apprentice—Arithmetic (2nd); Algebra (3rd); Geometry (3rd)
346—Champion, William, aged 18, St. Stephen's Evening School, Clerk—Book-keeping (3rd)
223—Chandler, Frederick, aged 16, Hertford L. and S. I., Teacher—Arithmetic (3rd); Book-keeping (3rd)
371—Chantry, Lucy, aged 21, Macclesfield Useful Knowledge Society, Silk-lash Maker—Domestic Economy (3rd)

340—Chapple, Frederic, aged 17, St. Stephen's Evening School, Pupil Teacher—English History (1st)
487—Charlesworth, Samuel, aged 34, People's College, Sheffield, Merchant's Clerk—German (3rd); Latin and Roman History (2nd)
373—Charlton, Thomas, aged 18, Middlesbro' M.I., Farmer—Chemistry (2nd)
526—Charter, George, aged 19, Wellingborough M.I., Apprentice to a Chemist and Druggist—Chemistry (3rd)
1107—Child, Amos, aged 21, Idle M.I., Clothier—Arithmetic (2nd); Book-keeping (3rd)
570—Clark, John Jackson, aged 17, City of London College, Broker's Clerk—Arithmetic (1st); Book-keeping (1st); Algebra (1st)
542—Clarke, Edward, aged 20, York Inst., Railway Clerk—Arithmetic (1st); English History (3rd); Geography (3rd)
597—Clarke, George, aged 20, City of London College, Clerk—Book-keeping (2nd); French (3rd)
577—Clarke, Henry George, aged 16, City of London College, Jeweller—Arithmetic (3rd); English History (2nd)
603—Clayton, James, aged 29, City of London College, Letter Sorter, General P. O.—French (2nd)
540—Clayton, Jonah, aged 20, York Inst., Clerk—Book-keeping (3rd)
714—Cleland, John Simon, aged 19, Glasgow Inst., Queen's Scholar—Arithmetic (1st) with 2nd Prize; Algebra (1st); English History (2nd); Mensuration (3rd)
770—Clough, Robert, aged 22, Halifax W.M. Coll., Assistant Teacher—English Literature (3rd)
96—Clough, William Henry, aged 17, Bradford M.I., Tallow Chandler—Arithmetic (2nd); Geography (3rd)
793—Cochrane, Peter, aged 17, Manchester M.I., Warehouseman—Book-keeping (2nd)
791—Cochrane, William, aged 19, Manchester M.I., Cabinet-maker—English History (3rd)
*619—Collens, Edward, aged 20, Bristol Trade School, Assistant in Laboratory—Chemistry (1st)
313—Collins, Samuel, aged 22, Leicester Church of England Inst., Hosier—Book-keeping (2nd)
652—Colquhoun, Robert, aged 21, Popular Evening Classes, Andersonian University, Glasgow, Miner—Mining and Metallurgy (2nd)
970—Conolly, Frederick Watson, aged 36, Wolverhampton Christian Inst., Druggist's Clerk—Chemistry (2nd)
930—Cooke, Christopher, aged 22, Stourbridge W.M. Inst., Clerk—Book-keeping (2nd)
489—Cooper, John William, aged 18, People's College, Sheffield, Model-maker—Arithmetic (2nd)
375—Cooper, Thomas Dawson, aged 18, Middlesbro' M.I., Surveyor—Free-hand Drawing (2nd)
626—Cosslett, Richard, aged 20, Bristol Young Men's Christian Association, Carpenter—Book-keeping (3rd)
924—Cotterell, John, aged 19, Messrs. Chance's Library, Smethwick, Glass Painter—Free-hand Drawing (2nd)
592—Cowan, John, aged 22, City of London College, Artificial Tooth maker—Arithmetic (3rd)
974—Cowern, Thomas, aged 24, Wolverhampton W.M. Coll., Warehouseman—Book-keeping (2nd)
324—Cowling, Samuel, jun., aged 16, Leicester Church of England Inst., Accountant's Clerk—Arithmetic (2nd); Book-keeping (1st)
511—Cox, Henry, aged 19, Thirsk M.I., Pupil Teacher—Arithmetic (2nd); English History (2nd); Mensuration (3rd)
227—Cox, William, aged 16, Hertford L. and S.I., Gentleman's Servant—Arithmetic (3rd)
684—Cranston, George, aged 16, Popular Evening Classes, Andersonian University, Glasgow, Chemist—Chemistry (1st)
*544—Crews, Henry George, aged 21, City of London College, Mercantile Clerk—Arithmetic (1st)
721—Crichton, James, aged 22, Glasgow Inst., Merchant's Clerk—Book-keeping (1st)
236—Crickmer, Joseph, aged 24, Ipswich W.M. Coll., Engineer's Clerk—Book-keeping (1st)
42—Cropper, John, aged 20, Bacup M.I., Warper—Arithmetic (3rd)
314—Crosher, William, aged 25, Leicester Church of England Inst., Hosier—Electricity, Magnetism, and Heat (1st), with 1st Prize; Animal Physiology (2nd)
1015—Crossley, Jonas, aged 16, Burnley M.I., Weaver—Arithmetic (3rd)
*741—Crossley, Joseph, aged 21, Harrison-road Young Men's Society, Halifax, Manufacturing Chemist—Book-keeping (2nd)
756—Crowther, James, aged 22, Halifax W.M. Coll., Book-keeper—Book-keeping (1st)
1020—Cunliffe, William, aged 30, Burnley M.I., Blacksmith—Chemistry (2nd); Freehand Drawing (2nd); Electricity, Magnetism, and Heat (3rd); Practical Mechanics (3rd)
1008—Cunliffe, Samuel, aged 18, Burnley M.I., Joiner's Apprentice—Arithmetic (2nd); Chemistry (2nd)
690—Currie, David, jun., aged 23, Popular Evening Classes, Andersonian University, Glasgow, Commercial Clerk Electricity, Magnetism, and Heat (3rd)
834—Daggatt, William, aged 19, Manchester M.I., Clerk—Book-keeping (3rd)
302—Dalton, Edward, aged 19, Leeds Young Men's Christian Association, Hosier, &c.—Book-keeping (2nd)
773—Davenport, James, aged 23, Lichfield W.M. Assoc., Grocer, Arithmetic (2nd); Book-keeping (2nd)
982—Davies, Joseph, aged 20, Wolverhampton W.M. Coll., Mechanic—Practical Mechanics (3rd)
832—Davies, Richard Meredith, aged 25, Manchester M.I., Mercantile Clerk—Book-keeping (2nd)
113—Davis, Christopher G., aged 17, Bury St. Edmund's Athenæum—Arithmetic (2nd); Algebra (3rd)
*839—Day, Alfred, aged 24, Manchester M.I., Cabinet maker—Geometrical Drawing (3rd)
557—Day, John, aged 20, City of London College, Clerk—Arithmetic (2nd); Book-keeping (1st)
993—Dean, William, aged 23, Wolverhampton W.M. Coll., Railway Clerk—Book-keeping (1st); Practical Mechanics (1st), with 1st Prize; Geometry (2nd)
444—Deane, John, aged 25, Salford W.M. Coll., Clerk in Silk Warehouse—French (3rd)
1061—Dewar, Daniel, aged 19, Glasgow M.I., Assistant Teacher—Arithmetic (1st); Latin and Roman History (3rd)
95—Dewhirst, Richard, aged 18, Bradford M.I., Warehouseman—Geography (3rd)
551—Dickinson, George, aged 18, City of London College, Assistant to a Chemist—French (3rd)
658—Dickson, James, aged 24, Popular Evening Classes, Andersonian University, Glasgow, Clerk—Arithmetic (2nd); Principles of Mechanics (1st) with 1st Prize
1005—Dills, William John, aged 19, Faversham Inst., Dispenser—Animal Physiology (2nd)
891—Dinenage, William Henry, aged 30, Southampton Athenæum, Clerk—Arithmetic (2nd)
512—Dixon, Alexander Campbell, aged 17, Thirsk M.I., Pupil Teacher—Arithmetic (2nd); Book-keeping (3rd); Geography (2nd)
468—Dobell, Douglas David, aged 18, Scarborough M.I., Clerk to Surveyor of Taxes—Arithmetic (3rd); English History (3rd); Geography (3rd)

483—Dodworth, George Thompson, aged 20, People's College, Sheffield, Table-blade Forger—Arithmetic (2nd)
507—Dorrell, Henry Benjamin, aged 16, Slough M.I., Carpenter—Geometrical Drawing (3rd); Freehand Drawing (3rd)
1063—Douglas, David, aged 16, Glasgow M.I., Clerk—Book-keeping (2nd)
1023—Douglas, John Christie, aged 19, London M.I., Government Science Teacher—Arithmetic (3rd)
948—Drew, Samuel, aged 18, Walsall W.M. Col., Butcher—Arithmetic (3rd)
601—Druller, Sidney, aged 21, City of London College, Clerk in Post-office—Book-keeping (1st)
604—Duckworth, James, aged 26, Accrington M.I., Store-keeper—Chemistry (2nd)
910—Duffell, John, aged 16, Messrs. Chance's Library, Smethwick, Clerk—Arithmetic (2nd)
494—Dufty, Joseph, aged 20, People's College, Sheffield, Confectioner—French (2nd)
19—Duncan, Alexander, aged 21, Aberdeen M.I., Clerk—Arithmetic (3rd); Book-keeping (3rd)
578—Dunstall, William Harold, aged 19, City of London College, Solicitor's Clerk—Book-keeping (1st)
729—Eadie, Donald, aged 16, Glasgow Inst., Clerk—Book-keeping (3rd)
415—Eadie, John, aged 25, Paisley Artisans' Inst., Teacher—Music (1st)
91—Earnshaw, Richard F., aged 17, Bradford M.I, in a Merchant's Stock-room—Book-keeping (3rd)
56—Eastwood, James Henry, aged 17, Haslingden Inst., Weaver—Chemistry (3rd)
801—Edeson, John, aged 16, Manchester M.I., Clerk in Insurance Office—Book-keeping (2nd)
587—Edwards, Robert William, aged 21, City of London College, Assistant to a Stationer—Book-keeping (2nd)
426—Edwards, Thomas, aged 18, Pembroke Dock M.I., Shipwright—Arithmetic (2nd)
138—Ellis, Charles Jones, aged 24, Devonport M.I., Shipwright—English History (1st), with Prize of Books to the value of £1; Mensuration (3rd)
139—Ellis, Richard John, aged 18, Devonport M.I., Shipwright Apprentice—Mensuration (2nd)
543—Elsey, Edwin, aged 20, City of London College, Accountant—Book-keeping (1st)
308—Embleton, Charles Andrew, aged 18, Leeds Young Men's Christian Association, Mechanic—Arithmetic (3rd); Geometry (2nd)
1025—Emmens, Stephen Henry, aged 19, London M.I., Clerk in Church of England Assurance Co.—Logic and Mental Science (1st), with 1st prize
79—Esau, Alfred James, aged 28, Barnet Inst., Schoolmaster—Music (2nd)
**777-Evans, George, aged 24, Polytechnic Inst., Butcher—Arithmetic (2nd)
239—Evans, John William, aged 18, Ipswich W.M. Coll., Pupil-teacher—Arithmetic (3rd); Geography (3rd)
807—Eyres, Robert, aged 23, Manchester M.I., Warehouseman—English History (3rd)
178—Fairlie, Henry, aged 19, Glasgow Athenæum, Clerk—Latin and Roman History (3rd)
177—Fairlie, James, aged 20, Glasgow Athenæum, Clerk—Book-keeping (3rd)
344—Fancourt, George, aged 18, St. Stephen's Evening School, Barrister's Clerk—Arithmetic (3rd)
131—Farncomb, Edward, aged 36, Greenwich M.I., Teacher of Drawing—Free-hand Drawing (1st)
757—Farrar, Edward, aged 23, Halifax W.M. Coll., Railway Servant—Book-keeping (1st)
584—Faulkner, Richard, aged 20, City of London College, Banker's Clerk—Arithmetic (2nd)
252—Fearnside, Christopher, aged 19, Leeds M.I., Clerk in an Insurance Office—English Literature (2nd)
676—Fillans, Robert Napier, aged 18, Popular Evening Classes, Andersonian University, Glasgow, Practical Engineer—Practical Mechanics (3rd)
322—Findley, George William, aged 17, Leicester Church of England Inst., Bookseller—Music (1st); French (2nd)
143—Fitze, William James, aged 18, Devonport M.I., Shipwright Apprentice—Geometry (1st), with 1st Prize; Trigonometry (2nd)
1002—Fletcher, Henry, aged 21, Wordsley Mut. Imp. Soc., Assistant Teacher—Geography (1st)
253—Flockton, William, aged 27, Leeds M.I., Clerk in an Insurance Office—English Literature (2nd)
360—Flood, Edward Pomeroy, aged 18, St. Peter's Reading Room, Westminster, Pupil Teacher—English History (2nd); Geography (3rd)
*349—Forster, William Deniston, aged 19, St. Thomas' Charterhouse Evening Classes, Policeman—Arithmetic (2nd)
788—Foster, Frederick, aged 23, Manchester M.I., Warehouseman—Book-keeping (1st)
*1007—Foulds, Thomas, aged 18, Bromley M.I., Warehouseboy—Book-keeping (3rd)
1019—Fox, William James, aged 20, Bromley M.I., Colorist—Chemistry (2nd)
841—France, John Cyrus, aged 22, Oldham Science School, Smith—Geometrical Drawing (3rd)
1030—Francis, Joseph, aged 17, London M.I., Engineer—Practical Mechanics (3rd); Principles of Mechanics (3rd)
71—French, Alfred, aged 23, Banbury M.I., Baker—Chemistry (2nd)
645—French, John, aged 20, Popular Evening Classes, Andersonian University, Glasgow, Miner—Mining and Metallurgy (2nd)
26—French, William Wilson, Farnham Young Men's Inst., Teacher—Arithmetic (2nd); Book-keeping (3rd).
231—Frewer, James Buckingham, aged 18, Ipswich W.M. Coll., Stone and Marble Mason—Music (3rd).
506—Fryer, Thomas, aged 17, Slough M.I., Clerk—Geometrical Drawing (3rd)
617—Fulford, Elizabeth, aged 19, Birmingham and Midland Inst.—French (2nd); Geography (1st)
303—Furbank, Robert Archer, aged 18, Leeds Young Men's Christian Assoc., Banker's Clerk—Algebra (1st), with 2nd Prize
992—Furmage, William Dean, aged 19, Wolverhampton W.M. Coll., Engineer—Arithmetic (3rd)
1096—Galloway, Thomas, aged 19, Newcastle-on-Tyne M.I., Clerk—Chemistry (1st)
795—Gardner, William, aged 18, Manchester M.I., Warehouseman—Book-keeping (2nd)
563—Gare, Henry Targett, aged 16, City of London College—Arithmetic (2nd)
585—Garside, Edward Samuel, aged 16, City of London College, Junior Clerk—Book-keeping (1st)
104—Gaunt, John Edward, aged 16, Bradford M.I., Lawyer's Clerk—Arithmetic (3rd); English History (2nd)
267—Gell, Maria Elizabeth, aged 16, Leeds M.I., Pupil—English History (3rd)
646—Gemmell, James, aged 22, Popular Evening Classes, Andersonian University, Glasgow, Coal Miner—Mining and Metallurgy (3rd)
116—Gibbs, John, aged 40, Chelmsford L. and M.I., Woolsorter—Geography (3rd)
1081—Gibson, William Inglis, aged 21, Glasgow M.I., Clerk—Political and Social Economy (3rd)
390—Gihon, John, aged 23, Oldham Lyceum, Civil Service—Trigonometry (3rd); Navigation and Nautical Astronomy (2nd)
270—Gilbert, Charles, aged 18, Leeds School of Art, Art Student—Freehand Drawing (3rd)

409—Gilchrist, Robert, aged 23, Paisley Artizan's Inst., Pattern Designer—Music (3rd)
354—Gill, Thomas Edmund, aged 18, St. Thomas' Charterhouse, Stamper—Arithmetic (3rd)
775—Gill, William Henry, aged 23. Hackney Working Men's Inst., Clerk—Music (2nd); Free-hand Drawing (2nd)
732—Gilmour, James, aged 18, Glasgow Inst., Warehouseman—Latin and Roman History (3rd)
784—Gilson, Robert Baker, aged 19, Polytechnic Inst., Clerk—Chemistry (3rd)
211—Glen, James, aged 22, Glasgow Athenæum, Clerk—French (2nd)
431—Goodacre, Robert, aged 18, Peterborough M.I., Pupil Teacher—Arithmetic (1st); English Literature (2nd)
348—Goode, Frederick James, aged 19, St. Stephen's Evening Schools, Schoolmaster—Algebra (2nd); Music (3rd)
343—Goodfellow, David, aged 17, St. Stephen's Evening School, Pupil Teacher—Arithmetic (3rd)
331—Gordon, Robert, aged 22, Liverpool Inst., Engineer—Algebra (1st); Principles of Mechanics (2nd); Geometrical Drawing (3rd)
2—Gordon, Robert, aged 20, Aberdeen M.I., Cabinet-maker—Arithmetic (3rd); Free-hand Drawing (3rd)
666—Gourlay, John, aged 26, Popular Evening Classes, Andersonian University, Glasgow, Clerk—Logic and Mental Science (2nd)
145—Gowings, William, aged 19, Devonport M.I., Shipwright Apprentice—Mensuration (2nd); Trigonometry (3rd)
632—Graham, Michael, aged 16, Darlington Church of England Inst., Clerk—Arithmetic (1st)
502—Grantham, Henry, aged 23, Slough M.I., Coach Wheelwright—Free-hand Drawing (3rd)
550—Gregory, William Henry, aged 19, City of London College, Assistant Librarian—Free-hand Drawing (3rd)
410—Green, David, aged 33, Paisley Artizans' Inst., Warehouseman—Music (3rd)
567—Green, Charles, aged 24, City of London College, Clerk—Book-keeping (1st)
528—Green, George, aged 27, Wellingborough M.I., Draper's Assistant—Book-keeping (2nd)
456—Gretton, John Jenkins, aged 16, Salford W.M. Coll., Pupil Teacher—Arithmetic (3rd)
262—Griffiths, David, aged 24, Leeds M.I., Book-keeper—Chemistry (3rd)
427—Griffiths, William, aged 18, Pembroke Dock M.I., Pupil Teacher—Arithmetic (1st); Geography (2nd)
117—Grigsby, David Day, aged 48, Chelmsford L. and M.I., Solicitor's Clerk—Geography (3rd)
636—Grieveson, John, aged 30, Darlington Church Inst., Railway Agent—English History (1st) with 2nd Prize
621—Griffith, William Henry, aged 20, Bristol Trade and Mining School, Chemist and Druggist—Chemistry (1st), with 2nd Prize.
821—Grundy, Joseph, aged 20, Manchester M.I., Railway Clerk—Book-keeping (2nd)
1039—Haggitt, Catherine Susannah, aged 37, London M.I., Governess—German (3rd)
534—Haines, Harry Charles, aged 17, Worcester Railway L.I., Railway Clerk—Arithmetic (3rd); Geometry (2nd)
125—Hall, Charles Richard, aged 16, Chelmsford L. and M.I., Plumber and Painter—Free-hand Drawing (3rd)
517—Hall, James Butler, aged 18, Wakefield M.I., Overlooker—Book-keeping (3rd)
392—Hall, John, aged 19, Henshaw-street Mut. Imp. Inst., Oldham, Book-keeper—Arithmetic (3rd)
688—Hall, John, aged 26, Popular Evening Classes, Andersonian University, Glasgow, Inland Revenue Officer—Chemistry (1st)
294—Halliday, John, aged 21, Leeds Young Men's Christian Association, Warehouseman—Book-keeping (2nd)
766—Halliday, John, aged 20, Halifax W.M. Coll, Warehouseman—Book-keeping (2nd); English Literature (2nd)
871—Hallsworth, Harry, aged 18, Oldham Science School, Draughtsman—Geometrical Drawing (3rd)
581—Halsey, William, aged 18, City of London College, Clerk—Arithmetic (3rd); Book-keeping (1st)
1007—Halstead, James, aged 20, Burnley M.I., Weaver—Chemistry (2nd)
607—Hamer, Thomas, aged 17, Accrington M.I., Weaver—Chemistry (2nd)
179—Hamilton, Archibald, jun., aged 19, Glasgow Athenæum, Grain Merchant's Clerk—Book-keeping (2nd)
338—Hammond, John, aged 19, St. Stephen's Evening School, Kid Glover—Arithmetic (2nd)
467—Hampson, David, aged 20, Hadfield Ed. Inst., Clerk—Arithmetic (3rd)
319—Hancock, John Henry, aged 22, Leicester Church of England Inst., Clerk—Arithmetic (2nd)
747—Hanson, Rufus, aged 16, Halifax W.M. Coll., Dyer—Chemistry (2nd)
572—Harding, James Staughton, aged 23, City of London College, Clerk—German (3rd)
957—Hardy, William Henry, aged 23, Wednesbury M.I., Clerk—Arithmetic (2nd)
1018—Hargreaves, Edmund, aged 17, Burnley M.I., Weaver—Chemistry (1st)
420—Harris, John, aged 20, Pembroke Dock M.I., Shipwright Apprentice—Arithmetic (3rd)
70—Harris, John Thomas, aged 17, Banbury M.I., Engineer—Chemistry (1st)
985—Harris, Joseph, aged 20, Wolverhampton W.M. Coll., Clerk—Arithmetic (3rd); Book-keeping (2nd)
802—Harrison, George, aged 19, Manchester M.I., Clerk—Arithmetic (3rd)
805—Harrison, John B., aged 30, Manchester M.I., Railway Clerk—Arithmetic (3rd)
806—Harrison, John Pownall, aged 17, Manchester M.I., Clerk—English History (3rd)
97—Harrison, Joseph, aged 21, Bradford M.I., Woolsorter—English Literature (2nd); Logic and Mental Science (2nd); Electricity, Magnetism, and Heat (3rd); Book-keeping (3rd)
274—Harrison, Joseph Crozier, aged 18, Leeds School of Art, Art Student—Free-hand Drawing (3rd)
378—Harrison, William, aged 16, Middlesbro' M.I., Farmer—Chemistry (3rd)
440—Harrison, William, aged 22, Salford W.M. Coll., Clerk—Chemistry (3rd)
184—Harvie, William, aged 23, Glasgow Athenæum, Commission Agent—German (3rd)
609 and 797—Harwood, William John, aged 24, Accrington M.I., Clerk—Chemistry (1st); French (2nd)
269—Hassé, Alexander B., aged 17, Leeds M.I., Printseller—Free-hand Drawing (3rd)
72—Haynes, John Frederick, aged 18, Banbury M.I., Solicitor's Clerk—English Literature (3rd)
1010—Healey, Thomas, aged 23, Burnley, M.I., Book-keeper—Book-keeping (1st)
108—Heap, Thomas, aged 17, Bury Athenæum, Letter-press Printer—Arithmetic (3rd)
670—Hedderwick, James David, aged 17, Popular Evening Classes, Andersonian University, Glasgow, Clerk—English Literature (1st), with 3rd Prize
877—Hemsley, William Botting, aged 19, Richmond Parochial Library, Assistant in the Herbarium, Kew—Botany (2nd)
588—Hempleman, Herman, aged 25, City of London Col., Clerk—Arithmetic (1st)
180—Henderson, Henry, aged 16, Glasgow Athenæum, Merchant's Clerk—Book-keeping (2nd)
691—Henderson, John, aged 36, Popular Evening Classes, Andersonian University, Glasgow, Letter-press Printer—Electricity, Magnetism, and Heat (1st), with 2nd Prize.
602—Higgins, George, aged 28, City of London College, Teacher—Music (2nd); Animal Physiology (3rd)

888—Higgs, James Henry, aged 26, Southampton Athenæum, Coach Painter—Arithmetic (3rd); Algebra (3rd)
822—Higson, Charles Howorth, aged 18, Manchester M.I., Railway Clerk—Book-keeping (2nd)
275—Hill, Alfred Judkins, aged 16, Leeds School of Art, Machinist—Free-hand Drawing (2nd)
37—Hill, Frederick, aged 18, S.E. Railway M.I., Pupil Teacher—Arithmetic (1st)
931—Hill, Thomas, aged 19, Amblecote Night School, Crate Maker—Arithmetic (3rd)
123—Hilliard, Thomas Edward Brewitt, aged 18, Pupil—Arithmetic (1st)
219—Hills, Henry George, aged 20, Hertford L. and S.I., Compositor—Book-keeping (2nd); Mensuration (3rd)
6—Hird, George Smith, aged 17, Aberdeen M.I., Architect—Geography (3rd)
496—Hobson, Ezra, aged 26, People's College, Sheffield, Farmer—Arithmetic (2nd)
904—Hodgetts, Charles Blakemore, aged 28, Cradley Night School, Blast Furnace Manager—Chemistry (1st), with 1st Prize
610—Hodgson, John Washington, aged 28, Accrington M.I., Colour-maker to a Calico Printer—Chemistry (1st)
575—Hogg, George, aged 18, City of London College, Clerk—Arithmetic (3rd)
246—Hole, John Mitchell, aged 16, Leeds M.I., Teacher—Arithmetic (1st); Geometry (2nd); English History (3rd); French (3rd)
1009—Holgate, James, aged 18, Burnley M.I., Clerk—Chemistry (1st); Electricity, Magnetism, and Heat (2nd)
404—Hollinhead, Thomas, aged 17, Werneth M.I., Pupil Teacher—Arithmetic (2nd)
533—Holloway, George O'Connor, aged 16, Kidderminster M.I., Auctioneer's Clerk—Arithmetic (2nd); Book-keeping (3rd); French (3rd)
923—Holloway, Isaac, aged 23, Messrs. Chance's Library, Glass Painter—Music (3rd)
1027—Holmes, George Hill, aged 22, London M.I., Clerk and Book-keeper—Arithmetic (2nd); Book-keeping (3rd)
449—Holt, Andrew, aged 24, Salford W.M. Coll., Engraver to Calico Printers—Arithmetic (3rd)
60—Horrocks, Richard, aged 17, Haslingden Inst., Book-keeper—Chemistry (2nd)
*1044—Horth, Benjamin, aged 19, Abbott's Ann Reading-rooms, Assistant Master—Arithmetic (3rd)
978—Hough, Joseph, aged 25, Wolverhampton W.M. Coll., Assistant in Observatory—Astronomy (3rd)
596—Howard, James Harris, aged 19, City of London College, Clerk—French (3rd)
466—Howard, Squire, aged 17, Salford W.M. Coll, Lithographic Artist—Freehand Drawing (2nd)
1028—Howes, Frederick, aged 18, London M.I., Clerk—Arithmetic (1st)
761—Howorth, Edward, aged 22, Halifax W.M. Coll., Woolsorter—Book-keeping (3rd)
367—Hubbard, Edmund Isle, aged 17, Louth M.I., Tutor—Arithmetic (3rd)
280—Huckvale, Elizabeth, aged 19, Leeds School of Art—Freehand Drawing (3rd)
120—Hudson, Thomas, aged 21, Chelmsford Literary and Mechanics' Inst., Grocer's Assistant—Arithmetic (1st)
817—Hudson, Thomas, aged 16, Manchester M.I., Clerk—Arithmetic (1st)
760—Hughes, Robert Thorpe, aged 23, Halifax W.M. Coll., Warehouseman—Book-keeping (2nd)
759—Hughes, William John, aged 18, Halifax W.M. Coll., Clerk—Book-keeping (2nd)
573—Humphrey, Benjamin, aged 18, City of London Coll., Clerk—Arithmetic (1st); Book-keeping (1st)
980—Humphreys, William, aged 22, Wolverhampton W.M. Coll., Tinplate Worker—French (3rd)
579—Hunt, John, aged 19, City of London Coll., Clerk—Arithmetic (1st); Book-keeping (1st)
181—Hutcheson, George, aged 18, Glasgow Athenæum, Clerk—Agriculture (3rd)
222—Ilott, James, aged 17, Hertford L. and S.I., Railway Clerk—Arithmetic (2nd); Book-keeping (2nd)
417—Inglis, James, aged 23, Paisley Artisan's Inst., Teacher—Arithmetic (2nd)
673—Inglis, William, aged 22, Popular Evening Classes, Andersonian University, Glasgow, Clerk—French (3rd)
955—Instone, Thomas, aged 19, Wednesbury M.I., Mechanical Engineer—Arithmetic (1st); French (3rd)
429—Ivemey, Thomas, aged 22, Pembroke Dock M.I., Caulker—English History (3rd)
919—Jack, James Alexander, aged 16, Messrs. Chance's Library, Smethwick, Glass Cutter—Arithmetic (3rd)
731—Jackson, George, aged 22, Glasgow Inst., Watchmaker—Logic and Mental Science (1st)
185—Jackson, John, aged 22, Glasgow Athenæum, Clerk—Domestic Economy (2nd)
767—Jackson, Joseph Morton, aged 19, Halifax W.M. Coll., Grocer's Assistant—English Literature (2nd)
154—Jago, Charles Samuel, aged 19, Devonport M.I., Art Pupil-teacher—Geometrical Drawing (3rd); Free-hand Drawing (2nd)
*1054—Jamieson, Benjamin, aged 23, Glasgow M.I.,—Book-keeping (2nd)
421—John, William, aged 18, Pembroke Dock M.I., Shipwright Apprentice—Mensuration (2nd); Trigonometry (3rd)
634—Johnson, Christopher, aged 19, Darlington Church of England Inst., Clerk—Arithmetic (2nd)
464—Johnson, John, aged 24, Salford W.M. Coll., Packer—Free-hand Drawing (2nd)
779—Johnson, Joseph Viner, aged 17, Polytechnic Inst., Hosier—Chemistry (3rd)
297—Johnson, Thomas, aged 25, Leeds Young Men's Christian Association, Grocer's Assistant—Book-keeping (2nd); English Literature (3rd)
332—Jones, William, aged 21, Liverpool M.I., Clerk—Arithmetic (1st); Book-keeping (1st)
88—Jowett, Archibald, aged 20, Bradford M.I., Grocer—Arithmetic (1st); Book-keeping (3rd)
93—Kaye, Uriah, aged 16, Bradford M. I., Woolsorter—Arithmetic (1st)
33—Kearns, Henry, aged 16, Aldershot Inst., Clerk—Arithmetic (1st); Geography (1st) with 1st prize; English History (3rd); Algebra (3rd)
780—Keen, William James, aged 19, Polytechnic Inst., Clerk—Book-keeping (1st)
869—Kershaw, Thomas, jun., aged 22, Oldham Science School, Mechanic—Geometrical Drawing (3rd)
350—Kett, Francis Leach, aged 17, St. Thomas Charterhouse Evening Classes, Pupil-teacher—Music (3rd)
291—Kettlewell, Emma, aged 18, Leeds School of Art—Free-hand Drawing (2nd)
1032—Keyte, William Richard, aged 17, London M.I., Engineer's Apprentice—Algebra (1st); Geometry (3rd)
*2—Kilgour, George, aged 18, Aberdeen M.I., Draper—Arithmetic (2nd)
624—Kilkeary, John, aged 23, Bristol Young Men's Christian Association, Book-keeper—Book-keeping (2nd)
411—Kilpatrick, William, aged 22, Paisley Artizans' Institution, Engineer—Music (3rd)
1071—King, James, aged 25, Glasgow M.I., Clerk—Mensuration (2nd)
220—Kingston, John Samuel, aged 17, Hertford L. and S.I., Grocer's Apprentice—Arithmetic (2nd); Book-keeping (2nd)
442—Kinloch, George, aged 27, Salford W.M. Coll., Colour Mixer—Chemistry (2nd)
1024—Kirk, Richard Edward Gent, aged 19, London M.I., Transcriber in H.M.'s Record Office—English History (1st); French (2nd)

87—Knight, Joseph, aged 21, Bradford M.I., Clerk—Animal Physiology (3rd)
221—Knight, Robert John, aged 18, Hertford L. and S.I., Railway Clerk—Arithmetic (2nd); Book-keeping (2nd)
484—Lacon, Joseph, aged 20, People's College, Sheffield, Merchant's Clerk—Book-keeping (3rd)
224—Lambert, James Newton, aged 17, Hertford L. and S.I., Machine Boy—Arithmetic (3rd)
59—Lane, John, aged 22, Haslingden Inst., Engraver—Chemistry (2nd)
497—Laughton, Richard Hind, aged 20, People's College, Sheffield, Clerk—Arithmetic (3rd)
556—Law, Calvert, aged 22, City of London College, Clerk—Arithmetic (1st)
527—Lawman, William, aged 18, Wellingborough M.I., Draper's Apprentice—Arithmetic (3rd)
186—Lawrie, David, aged 16, Glasgow Athenæum, Clerk in London and Lancashire Insurance Office—Book-keeping (1st)
187—Lawson, Charles Randolph, aged 24, Glasgow Athenæum, Engineer—French (2nd)
999—Lawson, James, aged 24, Willenhall Lit. Inst., Grocer's Assistant—Algebra (1st); Arithmetic (3rd)
148—Lemon, Charles Powell, aged 22, Devonport M.I., Shipwright—Arithmetic (1st)
591—Lesslie, Robert John, aged 19, City of London College, Clerk—Arithmetic (1st)
*543—Lewis, James, aged 27, City of London College, Teacher—Algebra (1st); Trigonometry (3rd); Conic Sections (3rd)
934—Lewis, William, jun., aged 21, Stourbridge M.I., Clerk—French (3rd)
996—Lightfoot, James, aged 20, Willenhall Lit. Inst., Assistant Teacher—Arithmetic (3rd); Geography (2nd)
188—Linn, William Campbell, aged 22, Glasgow Athenæum, Manufacturer—French (2nd)
137—Lishmund, John William, aged 23, Devonport M.I., Shipwright—Arithmetic (2nd); Algebra (2nd)
99—Liversedge, Alfred, aged 22, Bradford M.I., Warehouseman—Arithmetic (2nd); Algebra (2nd)
552—Lloyd, Thomas John, aged 21, City of London College, Clerk—Music (2nd)
513—Logan, Henry, aged 21, Wakefield M.I., Ironfounder—Mensuration (2nd); Practical Mechanics (2nd)
399—Longley, William, aged 42, Oldham Lyceum, Pipe Maker—Free-hand Drawing (2nd)
361—Loop, Samuel Henry, aged 18, St. Peter's Reading Room, Westminster, Pupil Teacher—English History (2nd); Free-hand Drawing (3rd)
52—Lord, John, aged 28, Bacup M.I., Timekeeper—Arithmetic (3rd)
39—Lord, William, aged 17, Bacup M.I., Clerk—Book-keeping (3rd); Algebra (3rd)
627—Lorymer, Edward, aged 18, Bristol Athenæum, Clerk in Dock Office—Arithmetic (1st); Book-keeping (2nd)
345—Lough, George James, aged 16, St. Stephen's Evening School, Architect's Pupil—Arithmetic (2nd)
81—Lough, William John, aged 19, People's Reading Rooms, Belfast, Draper's Assistant—Algebra (2nd)
67—Love, Albert Arthur, aged 21, Banbridge Lit. and Mut. Imp. Soc., Clerk—Arithmetic (3rd); Practical Mechanics (3rd); Book-keeping (2nd)
678—Macnair, Robert, aged 19, Pop. Evening Classes, Andersonian University, Clerk—Book-keeping (1st)
887—Mair, John Robert, aged 16, Southampton Athenæum, Clerk—Arithmetic (3rd)
84—Maitland, Alexander Smith, aged 17, People's Reading Rooms, Belfast, Apprentice to Linen Manufacturer—Arithmetic (2nd)
799—Makin, James, aged 28, Manchester M.I., Warehouseman—Book-keeping (2nd)
580—Marriott, Joseph Chillingworth, aged 29, City of London College, Clerk—Music (2nd)
155—Marshall, John, aged 18, Devonport M.I., Ironmonger—Arithmetic (2nd)
1062—Marshall, Patrick, aged 18, Glasgow M.I., Warehouseman—Book keeping (1st)
925—Marshallsay, Charles Allen, aged 19, Messrs. Chance's Library, Smethwick, Assistant Teacher—Arithmetic (2nd); English History (2nd); Geography (1st)
559—Masham, William George, aged 22, City of London College, Commercial Clerk—English History (1st), with Prize of Books to the amount of £1; Algebra (2nd)
884—Massey, William Ludgate, aged 16, Southampton Athenæum, Clerk—Arithmetic (1st)
412—Mathieson, John, aged 24, Paisley Artizan's Inst., Tailor—Music (3rd)
379—Matthews, Henry, aged 24, Middlesbro' M.I., Engine Fitter—Arithmetic (3rd)
168—Mayer, Annie, aged 17, Evening Science Classes, Secular School, Glasgow, Assistant Teacher—Animal Physiology (3rd)
334—McArthur, Charles, aged 18, Liverpool Inst., Clerk—English History (1st); French (2nd)
725—Mc Donald, Archibald, aged 41, Glasgow Inst., Book-keeper—Free-hand Drawing (3rd)
208—Mc Dougall, John, aged 29, Glasgow Athenæum, Book-keeper—English Literature (2nd)
206—Mc Ewan, Edward, aged 31, Glasgow Athenæum, Book-keeper—French (2nd)
1074—Mc Farlane, John Russell, aged 22, Glasgow M.I., Clerk—Botany (3rd)
692—Mc Gill, Francis, aged 23, Popular Evening Classes, Andersonian University, Glasgow, Paper-ruler—Chemistry (2nd)
207—McGlashan, John, aged 19, Glasgow Athenæum, Apprentice Engineer—Geometry (2nd)
641—McGowan, John, aged 33, Popular Evening Classes, Andersonian University, Glasgow, Colliery Oversman—Mining and Metallurgy (2nd)
719—McIlwraith, Robert, aged 17, Glasgow Inst., Pupil Teacher—Logic and Mental Science (2nd)
713—McInstosh, Margaret, aged 19, Glasgow Inst., Sempstress—Domestic Economy (2nd)
209—McKechnie, William, aged 23, Glasgow Athenæum, Chemist—French (3rd)
1059—McLachlan, William, aged 20, Glasgow M.I., Clerk—Arithmetic (3rd)
702—McLean, Peter, aged 22, Glasgow Inst., Clerk—Arithmetic (3rd)
562—McLeod, Bentley, aged 20, City of London College, Bill and Discount Broker—Arithmetic (2nd); Book-keeping (1st) with 2nd prize
7—McLeod, Neil, aged 18, Aberdeen M.I., Pupil Teacher—Arithmetic (3rd)
463—McLoughlin, James, aged 26, Salford W.M. Coll., Clerk—Arithmetic (3rd)
162—McMaster, Hugh Dunbar, aged 19, Gilford Young Men's Mut. Imp. Soc., Clerk—German (1st), with 1st Prize; Algebra (2nd)
733—McMillan, Andrew, aged 20, Glasgow Inst., Ironmonger's Assistant—Latin and Roman History (2nd)
704—McMillan, Hamilton, aged 26, Glasgow Inst., Wood Carver—Free hand Drawing (1st), with 1st Prize.
728—McMinn, Thomas, aged 18, Glasgow Inst., Clerk—Logic and Mental Science (2nd)
68—McMullan, Hugh, aged 22, Banbridge Lit. and Mut. Imp. Soc., Mechanic—Arithmetic (3rd); Practical Mechanics (3rd)

698—McMurtrie, John, aged 16, Glasgow Inst., Clerk—Book-keeping (2nd)
665—McNeil, Archibald, aged 25, Popular Evening Classes, Andersonian University, Glasgow, Teacher—Logic and Mental Science (1st)
80—McNiell, James, aged 16, People's Reading Rooms, Belfast, Teacher in National School—Arithmetic (3rd)
132—McRobbie, John, aged 21, Police Constable—Arithmetic (3rd)
122—Meade, Charles John, aged 17, Chelmsford L. and M.I., Private Pupil—Arithmetic (3rd); Algebra (3rd)
304—Meek, William Todd, aged 20, Leeds Young Men's Christian Assoc., Clerk—Book-keeping (2nd)
293—Mellor, William, aged 21, Leeds Young Men's Christian Assoc., Cloth Finisher—Book-keeping (2nd)
510—Metcalfe, Joseph, aged 18, Thirsk M.I., Pupil Teacher—English History (2nd); Geography (2nd)
1079—Millar, William James, aged 24, Glasgow M.I., Collector—Electricity, Magnetism, and Heat (2nd)
1065—Miller, Alexander, aged 17, Glasgow M.I., Clerk—Book-keeping (2nd)
217—Miller, Matthew, aged 16, Gosport and Alverstoke L. and S.I., Engineer Apprentice—Navigation and Nautical Astronomy (2nd); Algebra (2nd); Geometry (2nd)
12—Milne, James, aged 17, Aberdeen M.I., Clerk—Arithmetic (3rd)
256—Minikin, James Bennett, aged 22, Leeds M.I., Clerk—French (3rd)
315—Mitchell, Joseph, aged 18, Leicester Church of England Inst., Chemist's Apprentice—Arithmetic (3rd); English History (2nd); Animal Physiology (2nd); Logic and Mental Science (2nd)
134—Mondy, Edmund Felix, aged 17, Shipwright Apprentice—Algebra (3rd); Geometry (2nd)
189—Monro, Robert Hastie, aged 17, Glasgow Athenæum, Clerk in Accountant's and Stockbroker's Office—Book-keeping (3rd)
938—Moody, George, aged 19, Stourbridge M.I., Bookseller and Printer—Book-keeping (2nd)
249—Moore, Thomas, aged 16, Leeds M.I.—Arithmetic (2nd); Algebra (2nd); Geometry (2nd)
258—Moorhouse, James, aged 22, Leeds M.I., Miller's Clerk—French (3rd)
717—Morrison, Donald, aged 27, Glasgow Inst., Clerk of Taxes, Inland Revenue—Arithmetic (1st); English History (3rd)
961—Morris, Thomas, aged 16, West Bromwich Young Men's Christian Inst., Pupil Teacher—Arithmetic (2nd); Geography (2nd); English History (3rd)
436—Morris—William Meering, aged 24, Poole M.I., Carpenter and Joiner—Arithmetic (3rd); English History (3rd)
190—Morrison, Alexander, aged 23, Glasgow Athenæum, Cashier—Book-keeping (1st); French (2nd)
1093—Morrison, John, aged 17, Newcastle-on-Tyne M.I.—Arithmetic (3rd); Chemistry (3rd)
103—Mort, Joah, aged 16, Bradford M.I., Merchant's Clerk—Arithmetic (2nd)
49—Morton, James, aged 17, Bacup M.I., Bleacher—Arithmetic (3rd); Chemistry (2nd)
85—Morton, John, aged 29, People's Reading Rooms, Belfast, Book-keeper—French (3rd)
*1055—Morton, John, aged 17, Glasgow, M.I., Clerk—Arithmetic (1st); Mensuration (3rd)
716—Murdoch, Alexander Leamont, aged 24, Glasgow Inst., Clerk of Taxes, Inland Revenue—Arithmetic (3rd); Book-keeping (2nd)
674—Murdoch, Thomas Walker, aged 19, Pop. Ev. Classes, Andersonian University, Glasgow, Clerk—French (2nd)
349—Murray, William Charles, aged 18, St. Thomas Charterhouse Evening Classes, Book-keeper—English History (2nd); Algebra (2nd)
27—Nash, Alfred James, aged 16, Farnham Young Men's Inst., Auctioneer and Surveyor—Arithmetic (3rd); Book-keeping (3rd)
726—Neil, James, aged 17, Glasgow Inst., Clerk—Free-hand Drawing (3rd)
335—Neilson, George Hume, aged 29, Liverpool Inst., Letter Carrier—Arithmetic (2nd); Algebra (2nd); Geometry (2nd)
35—Nesbit, Thomas, aged 28, S.E. Railway M.I., Railway Clerk—Domestic Economy (1st), with 1st prize
963—Nevey, George Richard, aged 17, West Bromwich Y. Men's Christian Assoc., Pupil Teacher—Arithmetic (3rd)
359—Nicholls, Nathaniel Howick John, aged 19, St. Thomas Charterhouse, Clerk in Inland Revenue Office (proposed)—English History (2nd); Arithmetic (3rd)
647—Nisbet, John, aged 29, Pop. Ev. Classes, Andersonian University, Glasgow, Engine Keeper—Mining and Metallurgy (3rd)
1094—Noble, John, aged 22, Ncastle-on-Tyne M.I., Druggist—Chemistry (1st)
742—Noble, Joseph, aged 18, Black Dye Mills Inst., Halifax, Warehouseman—Book-keeping (2nd)
789—Noble, Joseph, aged 23, Manchester M.I., Warehouseman—Book-keeping (2nd)
574—Norris, George M., aged 21, City of London College, Clerk—English History (1st) with 1st Prize
1048—North, Edward, aged 17, Night School, Chute, Labourer—Arithmetic (2nd)
949—North, Henry, aged 20, Walsall W.M. Coll., Clerk—Geometry (1st)
685—Norval, George, aged 38, Popular Evening Classes, Andersonian University, Glasgow, Pattern Card-maker—Animal Physiology (1st) with 3rd Prize
40—Nuttall, Henry, aged 23, Bacup M.I., Weaver—Arithmetic (2nd); Chemistry (3rd)
905—Oakley, Simeon, aged 16, British Night School, Dudley, Clerk—Arithmetic (3rd)
312—Oddy, Charles, aged 29, Leeds Young Men's Christian Association, Clerk—Arithmetic (3rd)
152—Oleson, John Rowley, aged 21, Devonport M.I., Shipwright—Arithmetic (1st); Algebra (2nd); Mensuration (3rd)
997—Ordidge, James, aged 16, Willenhall Lit. Inst., Pupil Teacher—Arithmetic (2nd)
946—Ordish, James, aged 26, Walsall W.M. Coll., Police Officer—Arithmetic (2nd)
939—Orford, William, aged 18, Stourbridge M.I., Pupil Teacher—Book-keeping (3rd)
786—Orme, Joseph John, aged 27, Polytechnic Inst., Dressing case Manufacturer—French (2nd)
950—Overton, Frederick Job, aged 20, Walsall W.M. Coll., Saddler's Ironmonger—Arithmetic (1st); French (2nd)
119—Owers, Herbert, aged 16, Chelmsford L. and M.I., Clerk—Arithmetic (2nd)
553—Packenham, Jesse John, aged 30, City of London College, Viewer, Iron Inspection Department, Tower—Arithmetic (1st)
1108—Padgett, Henry, aged 20, Idle M.I., Clothier—Arithmetic (2nd); Book-keeping (3rd)
192—Pagan, John, aged 12, Glasgow Athenæum, Clerk—Book keeping (2nd)
191—Pagan, Robert, aged 24, Glasgow Athenæum, Clerk—Book-keeping (2nd)
656—Park, John, aged 21, Popular Evening Classes, Andersonian University, Glasgow, Engine-keeper—Mining and Metallurgy (2nd)

129—Parker, Francis, aged 20, Chelmsford L. and M. Inst., Confectioner—Free-hand Drawing (3rd)
995—Parkes, Samuel, aged 16, Willenhall Lit. Inst., Clerk—Arithmetic (3rd)
820—Parnell, William Bradshaw, aged 21, Manchester M.I., Clerk—Book-keeping (1st)
30—Parratt, James, aged 27, Farnham Young Men's Inst., Labourer—Arithmetic (2nd)
983—Parton, Thomas, aged 20—Wolverhampton W.M. Col., Mining Engineer—Chemistry (3rd)
77—Paterson, Arthur William, 19, Barnet Inst., Builder—Arithmetic (3rd); Book-keeping (2nd)
78—Paterson, Frederick, aged 17, Barnet Inst., Clerk in a Builder's Office—Music (2nd)
4—Paterson, John, aged 21, Aberdeen M.I., Joiner—English History (1st)
677—Patterson, Thomas L., aged 21, Pop. Even. Classes, Andersonian University, Glasgow, Clerk—Chemistry (3rd
1051—Payne, James, aged 19, Blandford Night School, Clerk—Logic and Mental Science (3rd)
470—Pearson, George, aged 18, Scarborough M.I., Clerk—Arithmetic (1st); English History (1st), with Prize of Books to the amount of £1
283—Pearson, Henry, aged 16, Leeds School of Art, Architect—Free-hand Drawing (2nd)
1104—Penn, Harry, aged 19, Hitchin M.I., Draper—Free-hand Drawing (1st), with 2nd prize
787—Penny, John Arthur, aged 24, Polytechnic Inst., Clerk in Railway Clearing House—Book-keeping (1st)
24—Peterkin, Henry, aged 17, Aberdeen M.I., Art Pupil-teacher—Free-hand Drawing (1st)
1045—Phillips, Herbert, aged 16, Night School, Lyme Regis, Clerk—Arithmetic (2nd); Geography (3rd)
257—Pickering, William Henry, aged 24, Leeds M.I., Clerk—French (3rd)
792—Pickford, Joseph, aged 16, Manchester M.I., Clerk—Book-keeping (1st)
21—Piggie, Thomas, jun., aged 17, Aberdeen M.I., Clerk—Arithmetic (1st)
515—Pilkington, Herbert, aged 21, Wakefield M.I., Millwright—Book-keeping (3rd)
38—Pilling, James, aged 25, Bacup M.I., Cotton Weaver—Mining and Metallurgy (3rd); Geography (3rd)
810—Pilling, James, aged 19, Manchester M.I., Pianist—Arithmetic (3rd)
416—Pinkerton, Robert, aged 28, Paisley Artizan's Inst., Tin-smith—French (3rd)
413—Pinkerton, William, aged 23, Paisley Artizan's Inst., Book-keeper—Book-keeping (2nd)
247—Pinder, John William, aged 16, Leeds M.I., Pupil—Arithmetic (3rd); English History (3rd); Geometry (3rd); Algebra (2nd)
462—Pollitt, George William, aged 16, Salford W.M. Coll., Clerk—Arithmetic (3rd)
23—Pope, Samuel, jun., aged 25, Aberdeen M.I., Clerk and Art-Pupil-teacher—Free-hand Drawing (2nd)
*775—Porter, Thomas, aged 17, Hackney Working Men's Inst., Pupil-teacher—Arithmetic (2nd)
554—Potter, Frederick William, aged 23, City of London College, Clerk—Electricity, Magnetism and Heat (3rd)
422—Potter, Nicholas Charles, aged 16, Pembroke Dock M.I., Pupil Teacher — Arithmetic (1st); Geography (2nd)
829—Power, James Ferguson, aged 24, Manchester M.I., Clothier's Assistant—Book-keeping (3rd)
299—Prestage, John William, aged 18, Leed's Young Men's Christian Assoc., Cloth Dresser—Arithmetic (3rd)
911—Price, Isaac, aged 21, Dudley M.I., Clerk—Book-keeping (1st)
57—Priestley, Samuel, aged 19, Haslingden Inst., Shoemaker—Electricity, Magnetism, and Heat (3rd); Chemistry (1st)
34—Pritchard, Christopher, aged 17, Clerk—Arithmetic (2nd); Geography (2nd)
976—Pyatt, William, aged 18, Wolverhampton W.M. Coll., Joiner—Arithmetic (3rd)
156—Quigley, Henry N., aged 18, Devonport M.I., Railway Clerk—Arithmetic (2nd); Book-keeping (2nd)
655—Radcliffe, James, aged 23, Popular Evening Classes, Andersonian University, Glasgow, Miner—Mining and Metallurgy (1st), with 2nd Prize
1—Rae, Alexander, aged 22, Aberdeen M.I., Clerk—Book-keeping (3rd)
790—Railton, Thomas Carleton, aged 18, Manchester M.I., Town Traveller—Chemistry (1st); Animal Physiology (1st), with 1st Prize
241—Rands, Walter Gladstone, aged 19, Ipswich W.M. Coll., Pupil Teacher—Arithmetic (1st); Book-keeping (2nd); Geography (2nd)
382—Ranson, William, junr., aged 21, Middlesborough M.I., Weigh Agent—Arithmetic (3rd)
898—Ray, William John, aged 19, Southampton Athenæum, Mechanical Engineer—Practical Mechanics (3rd)
837—Renshaw, Edward Gregory, aged 18, Manchester M.I., Clerk—Book-keeping (2nd)
941—Reome, Henry, aged 21, Stourbridge M.I., Grocer's Assistant—Book-keeping (3rd)
569—Rice, William Joseph Hammond, aged 20, Croydon L. and S.I., Carriage Trimmer—Arithmetic (2nd)
885—Richards, Henry, aged 31, Southampton Athenæum, Out-door Officer, H.M. Customs—Music (2nd)
425—Richards, John Peter, aged 16, Pembroke Dock M.I., Pupil Teacher—Arithmetic (2nd); Algebra (3rd)
142—Rickard, George James, aged 19, Devonport M.I., Shipwright Apprentice—Geometrical Drawing (1st) with 1st Prize; Algebra (2nd); Mensuration (2nd)
150—Rickard, George Pearn, aged 20, Devonport M.I.—Arithmetic (1st); Geometry (2nd); French (3rd)
195—Ricketts, William, aged 24, Glasgow Athenæum, Cashier—French (2nd)
159—Ridges, Robert A., aged 22, Gilford Young Men's Mutual Improvement Society, National Schoolmaster—Geography (3rd)
831—Rigby, Arthur, aged 17, Manchester M.I., Engineer—Geometrical Drawing (3rd)
991—Riley, Calverley Raby, aged 19, Wolverhampton W.M. Coll., Clerk—Arithmetic (1st); Practical Mechanics (2nd)
1073—Ritchie, Robert B., aged 16, Glasgow M.I., Clerk—Arithmetic (2nd); Book-keeping (2nd)
459—Roberts, Daniel, aged 17, Salford W.M. Coll., Letter-press Printer—Arithmetic (3rd)
282—Roberts, George, aged 16, Leeds School of Art, Joiner and Model-maker—Freehand Drawing (3rd)
446—Roberts, John, jun., aged 22, Salford W.M. Coll., Letterpress Printer—Logic and Mental Science (2nd)
558—Roberts, John William, aged 21, City of London College, Teacher—Arithmetic (2nd); Book-keeping (2nd); French (3rd)
537—Roberts, Joseph Seed, aged 22, York Inst., Cabinet-maker—English Literature (1st) with Prize of Books to the amount of £1; Electricity, Magnetism, and Heat (2nd); Domestic Economy (2nd)
106—Roberts, Thomas, aged 17, Bury (Lancashire) Athenæum, Engineer—Arithmetic (2nd)
709—Robertson, William, aged 17, Glasgow Inst., Chemist—Geometry (3rd)
216—Robinson, Daniel Edward, aged 18, Gosport and Alverstoke L. and S. I., Ship-builder's Clerk—Arithmetic (1st); Algebra (2nd); Geography (2nd); English History (3rd)

439—Robinson, Richard, aged 26, Salford Working Men's Coll., Indigo Dyer—Chemistry (3rd)
353—Roe, Henry James, aged 18, St. Thomas Charterhouse, Pupil Teacher—English History (3rd)
433—Rogers, Benjamin Robert, aged 18, Peterborough M.I., Pupil Teacher—Arithmetic (2nd); English History (1st); English Literature (1st)
18—Ronald, William, aged 20, Aberdeen M.I., Clerk—Arithmetic (2nd)
1105—Rose, David, aged 17, Hitchin M.I., Draper—Arithmetic (2nd)
697—Ross, David, aged 20, Glasgow Inst., Queen's Scholar—Arithmetic (1st); Book-keeping (1st); Algebra (1st); Mensuration (3rd)
874—Rothwell, Edmund, aged 17, Oldham Science School, Clerk—Geometrical Drawing (3rd)
637—Rowell, David, aged 16, Darlington Ch. of Eng. Inst., Pupil Teacher—Arithmetic (2nd)
889—Royall, Joseph, aged 24, Southampton Athenæum, Draughtsman (Ordnance Survey)—Free-hand Drawing (2nd)
229—Rudd, Charles, aged 19, Ipswich W. M. Coll., Clerk—Book-keeping (3rd)
240—Runicles, Edwin Haill, aged 18, Ipswich W. M. Coll., Pupil Teacher—Book-keeping (3rd)
352—Sadler, Frederick Charles, aged 17, St. Thomas Charterhouse, Pupil Teacher—Free-hand Drawing (3rd)
668—Sandeman, Edward, aged 22, Pop. Ev. Classes, Andersonian University, Glasgow, Clerk—Logic and Mental Science (2nd)
901—Sargeant, John, aged 18, Slough M.I., Carpenter—Geometrical Drawing (2nd)
305—Saville, James, jun., aged 21, Leeds Young Men's Christian Assoc., Clerk—Music (2nd)
625—Sawtell, Samuel A., aged 22, Bristol Young Men's Christian Assoc., Practical Jeweller—Book-keeping (2nd)
700—Scott, James, aged 18, Glasgow Inst., Clerk—Arithmetic (3rd)
14—Shand, William Murdoch, aged 20, Aberdeen M.I., Clerk—Algebra (2nd)
977—Shann, George, aged 16, Wolverhampton W.M. Coll., Clerk—Arithmetic (1st)
523—Sherwood, George, aged 17, Wellingborough M.I., Draper's Apprentice—Arithmetic (3rd)
794—Sidebotham, Samuel, aged 23, Manchester M.I., Clerk—French (1st)
1072—Simpson, William, aged 19, Glasgow M.I., Clerk—Political and Social Economy (3rd)
706—Sinclair, James, aged 17, Glasgow Inst., Clerk—Arithmetic (1st)
36—Skelton, John Henry, aged 19, South Eastern Railway M.I., Railway Clerk—Algebra (2nd)
629—Skinner, Andrew, aged 17, Carlisle M.I., Stationer—Book-keeping (2nd)
1026—Slater, Walter, aged 22, London M.I., Clerk—English Literature (1st), with 1st Prize; Latin and Roman History (1st), with 1st Prize; Music (2nd)
524—Slinn, Thomas Partridge, aged 18, Wellingborough M.I., Clerk—Book keeping (2nd)
683—Sloan, John, aged 31, Popular Evening Classes, Andersonian University, Glasgow, Jacquard Power-loom Tenter—Electricity, Magnetism, and Heat (2nd)
529—Smalley, James, aged 46, Wigan M.I., Tailor and Draper—Music (1st), with 1st Prize.
682—Smart, Alexander W., aged 22, Popular Evening Classes, Andersonian University, Glasgow, Manufacturer—Astronomy (2nd)
1060—Smellie, George, aged 18, Glasgow M.I., Measurer—Arithmetic (1st); Mensuration (3rd)
443—Smethurst, James, aged 37, Salford W.M. Coll., Core Maker—Chemistry (1st)
1047—Smith, Alfred, aged 16, Night School, Chute, Pupil Teacher—English History (3rd)
764—Smith, Baxendale, aged 18, Halifax W.M. Coll. Clerk—Book-keeping (2nd)
951—Smith, Benjamin, aged 22, Dudley M.I., Colliery Clerk—Mensuration (3rd)
765—Smith, Benjamin Greenwood, aged 19, Halifax W.M. Coll., Brass-moulder—English Literature (3rd)
376—Smith, David, aged 22, Middlesbro' M.I. Out door Officer (Customs)—Book keeping (3rd)
926—Smith, Henry William, aged 17, Messrs Chance's Library, Smethwick, Wheelwright—Geography (3rd)
94—Smith, James, aged 17, Bradford M.I., Warehouseman—Geography (2nd)
197—Smith, James, aged 17, Glasgow Athenæum, Railway Clerk—Book-keeping (2nd)
44—Smith, James H., aged 20, Bacup M.I., Weaver—Arithmetic (3rd)
590—Smith, James Rigby, aged 22, City of London College, Bootmaker—Arithmetic (1st); Political and Social Economy (1st), with 1st Prize; Geometry (1st)
408—Smith, John, aged 25, Paisley Artizan's Inst., Cartwright—Music (3rd)
1095—Smith, John Embleton, aged 20, Newcastle-on-Tyne M.I., Clerk—Arithmetic (2nd); Geography (3rd)
22—Smith, John Maxwell Dalrymple, aged 22, Aberdeen M.I., Stonecutter—Free-hand Drawing (2nd)
608—Smith, Richard, aged 16, Accrington M.I., Color Maker—Chemistry (1st)
*545—Smith, Thomas, aged ?0, City of London College, Merchant's Clerk—Arithmetic (1st)
638—Smith, Thomas Edward, aged 17, Darlington Church of Eng. Inst., Pupil Teacher—Arithmetic (1st)
681—Smith, Thomas Greig, aged 36, Popular Evening Classes, Andersonian University, Glasgow, Warehouseman—English Literature (2nd); Geometry (2nd)
3—Smith, William, aged 21, Aberdeen M.I., Iron Turner—Algebra (2nd)
325—Sneath, George, aged 21, Leicester Ch. of Eng. Inst., Accountant's Clerk—Algebra (2nd)
504—Snowball, William, aged 17, Slough M.I., Builder—Geometrical Drawing (3rd)
278—Snowdon, William, aged 17, Leeds School of Art, Engineer—Free-hand Drawing (3rd)
1029—Spearing, Mary Ann, aged 19, London M.I., Governess—Latin and Roman History (2nd)
438—Spence, James Carmichael, aged 16, Portsea Watt Inst., Engineer's Apprentice—Arithmetic (2nd); Algebra (3rd); Geometry (3rd)
927—Spencer, James, aged 18, Messrs. Chance's Library, Smethwick, Pupil Teacher—Arithmetic (3rd); Free-hand Drawing (1st)
749—Spencer, John, aged 21, Halifax W.M. Coll., Woolsorter—Arithmetic (3rd); Chemistry (3rd)
962—Spencer, John, aged 17, West Bromwich Young Men's Christian Inst., Clerk—Arithmetic (2nd); Free-hand Drawing (3rd)
147—Spiller, William, aged 19, Devonport M.I., Shipwright's Apprentice—Arithmetic (1st); Book-keeping (2nd); Algebra (2nd); Mensuration (3rd)
819—Spriggs, Christopher, aged 34, Manchester M.I., Mechanic—Geometrical Drawing (3rd)
876—Stanton, George, aged 22, Richmond Young Men's Society, Gardener—Botany (3rd)
32—Stewart, Francis, aged 19, Farnham Young Men's Institution, Teacher—Arithmetic (2nd)
1070—Stewart, Henry, aged 24, Glasgow M.I., Clerk—Arithmetic (1st)
833—Stewart, John Mackenzie, aged 25, Manchester M.I., Clerk—Book-keeping (2nd)

43—Stewart, Robert, aged 21, Bacup M.I., Book-keeper—Chemistry (3rd)
46—Stewart, Robert, aged 17, Bacup M.I., Pupil Teacher—Arithmetic (2nd); Geography (3rd)
199—Stirling, Hugh Auchinclass, aged 31, Glasgow Athenæum, Clerk—Book-keeping (2nd)
689—Stoker, George Naylor, aged 24, Popular Evening Classes, Andersonian University, Glasgow, Inland Revenue Officer—Chemistry (1st)
628—Stoker, John, aged 16, Carlisle M.I., Pupil Teacher—Geography (3rd)
215—Stokes, Richard, aged 19, Gosport and Alverstoke L. and S.I., Civil Service (prospectively)—Arithmetic (3rd); Book-keeping (3rd)
365—Stone, Hubert, aged 16, St. Peter's Reading Room, Westminster, Pupil Teacher—Arithmetic (3rd); English History (3rd); Geography (3rd)
735—Struthers, Andrew, aged 18, Glasgow Inst, Commercial Clerk—Latin and Roman History (3rd)
1035—Sturgeon, Thomas, aged 19, London M.I., Draughtsman—Electricity, Magnetism, and Heat (2nd)
589—Sudell, Henry James, aged 22. City of London College, Clerk—Arithmetic (1st)
1006—Sumner, Henry, aged 20, Burnley M.I., Cotton Weaver—Arithmetic (3rd); Chemistry (2nd)
815—Sutcliff, William, aged 17, Manchester M.I., Clerk—Animal Physiology (3rd)
763—Sutcliffe, Samuel, aged 19, Halifax W.M. Coll., Joiner—Arithmetic (1st); Book-keeping (1st)
835—Sutcliffe, William Thompson, aged 16, Manchester M.I., Clerk—Arithmetic (1st)
929—Sutton, George Daniel, aged 17, Stourbridge Young Men's Assoc., Pupil Teacher—Arithmetic (2nd)
753—Sutton, James, aged 22, Halifax W.M. Coll., Overlooker—Book-keeping (2nd)
200—Swan, Frederick George, aged 22, Glasgow Athenæum, Clerk—French (2nd)
1022—Symon, James Sutherland, aged 27, London M.I., Clerk—Electricity, Magnetism, and Heat (1st); Logic and Mental Science (1st), with 2nd Prize; English History (2nd)
*547—Tallerman, Lewis Abraham, aged 18, City of London College, Clerk—Book-keeping (1st)
201—Taylor, Bruce, junr., aged 18, Glasgow M.I., Grocer's Clerk—Arithmetic (3rd)
771—Taylor, Frederick, aged 17, Halifax W.M. Coll., Pupil Teacher—Arithmetic (1st); Book-keeping (2nd)
377—Taylor, Henry Hylton, aged 16, Middleborough M.I., Chemist and Druggist—Chemistry (3rd)
393—Taylor, John, aged 28, Werneth M.I., Millwright—Music (3rd)
914—Taylor, John, aged 19, Kinver National School, Assistant Master—Arithmetic (2nd)
762—Taylor, Joseph, aged 18, Halifax W.M. Coll., Warehouseman—Arithmetic (2nd)
447—Teasdale, George, aged 27, Salford W.M. Coll., Warehouseman—Logic and Mental Science (3rd)
654—Tennent, Robert, aged 21, Popular Evening Classes, Andersonian University, Glasgow, Miner—Mining and Metallurgy (3rd)
149—Thearle, Samuel, aged 17, Devonport M.I., Shipwright Apprentice—Arithmetic (1st); Algebra (1st); Mensuration (3rd)
781—Thelwall, Susanna, aged 32, Polytechnic Inst., Governess—German (1st); French (2nd)
*1006—Thompson, James, aged 21, Burnley M.I., Railway Clerk—Arithmetic (2nd); Book-keeping (2nd)
460—Thompson, John, aged 17, Salford W.M. Coll., Clerk—Arithmetic (2nd)
488—Thompson, John Drebble, aged 26, People's College, Sheffield, File Manager—German (3rd)
316—Thompson, William Thomas, aged 18, Leicester Church of England Inst., Clerk—French (3rd)
1055—Thomson, Archibald, aged 26, Glasgow M.I., Student—English Literature (3rd)
671—Thomson, James Alexander, aged 16, Popular Evening Classes, Andersonian University, Glasgow, Clerk—French (3rd)
1076—Thomson, John, aged 20, Glasgow M.I., Clerk—Chemistry (1st)
298—Tiffany, John Barnes, aged 19, Leeds Young Men's Christian Association, Tobacco Manufacturer—Arithmetic (3rd); Algebra (2nd); Geometry (1st)
989—Timbs, Richard, aged 25, Wolverhampton W.M Coll., Railway Clerk—Arithmetic (3rd)
*1008—Thornber, Thomas, aged 16, Burnley M.I., Warehouse Boy—Arithmetic (2nd)
1004—Thornicraft, Thomas Charles, aged 17, Faversham Inst., Apprentice to a Surgeon—Arithmetic (2nd)
301—Todd, William, aged 17, Leeds Young Men's Christian Association, Woollen Manufacturer—Arithmetic (1st); Geography (1st)
358—Tope, William Charles, aged 20, St. Thomas Charterhouse, Assistant Surveyor—English History (1st); Arithmetic (2nd); Geography (3rd)
811—Topliff, Samuel, aged 19, Manchester M.I., Clerk—Book-keeping (2nd)
755—Townsend, Henry, aged 27, Halifax W.M. Coll., Carpet Weaver—Book-keeping (2nd)
244—Trant, William, aged 19, Leeds M.I., Clerk—Astronomy (2nd)
362—Trepte, George Frederick, aged 18, St. Peter's Reading Room, Westminster, Pupil Teacher—Arithmetic (3rd); English History (3rd); Geography (2nd)
28—Trout, Thomas, aged 18, Aldershot Inst., Clerk—Arithmetic (3rd)
1064—Tudhope, Thomas, aged 17, Glasgow M.I., Clerk—Book-keeping (2nd)
680—Turnbull, Alexander J., aged 17, Popular Evening Classes, Andersonian University, Glasgow, Civil Engineer—French (3rd)
202—Turnbull, George, aged 27, Glasgow Ath., Clerk—French (2nd)
323—Turner, Horatio, aged 16, Leicester Church of Eng. Inst., Elastic Web Manufacturer—Music (3rd)
109—Unsworth, William, aged 35, Bury (Lancashire) Athenæum, Boot and Shoemaker—Music (2nd)
5—Urquhart, Peter, aged 20, Aberdeen M.I., Clerk—English History (1st) with 3rd prize
272—Utley, Southwell, aged 21, Leeds M.I., Architect's Clerk—Free-hand Drawing (3rd)
8—Valentine, John Sutherland, aged 20, Aberdeen M.I., Clerk—Arithmetic (3rd); Algebra (2nd); Principles of Mechanics (3rd)
160—Valentine, William, aged 22, Gilford Young Men's Mut. Imp. Soc., Clerk—Book-keeping (2nd)
900—Vaughan, Jonathan, aged 16, Messrs. Bagnall's Schools, Gold's Hill, West Bromwich, Fitter—Arithmetic (3rd)
595—Vaughan, William, aged 22, City of London College, Clerk—Algebra (1st), with 1st Prize; Trigonometry (1st), with 1st Prize; Conic Sections (1st), with 1st Prize; *and His Royal Highness the Prince Consort's Prize of 25 Guineas.*
818—Vosper, Thomas, aged 17, Manchester M.I., Pupil Assistant to a Chemist—Chemistry (1st)
1078—Waddington, Albert, aged 20, Glasgow M.I., Inland Revenue Officer—Arithmetic (2nd)
210—Wade, James, aged 26, Glasgow Athenæum, Cashier—French (2nd)

300—Wainwright, Henry, aged 19, Leeds Young Men's Christian Association, Merchant's Clerk—Arithmetic (1st)
774—Waldren, Arthur Charles, aged 18, Lichfield W.M. Assoc., Draper—Arithmetic (3rd)
271—Walker, Henry, aged 19, Leeds School of Art, Architect's Pupil—Free-hand Drawing (2nd)
15—Wallace, Thomas, aged 21, Aberdeen M.I., Assistant Teacher—Algebra (3rd)
366—Wallis, William Emerson, aged 17, Louth M.I.—Arithmetic (1st); Book-keeping (1st); Algebra (2nd); Mensuration (2nd)
391—Wallwork, James, aged 19, Henshaw-street, Oldham, Mutual Improvement Inst.—Arithmetic (3rd)
619—Walter, Eliza, aged 19, Bristol Athenæum—French (3rd)
309—Walton, John Ash, aged 19, Leeds Young Men's Christian Association, Clerk—Arithmetic (3rd); Book-keeping (2nd)
75—Ward, Thomas, aged 20, Banbury M.I., Commercial Clerk—Chemistry (1st)
605—Ward, Thomas Bernard, aged 20, Accrington M.I., Book-keeper—Chemistry (2nd)
58—Wardleworth, William, aged 18, Rawtenstall M.I., Book-keeper—Chemistry (1st)
1077—Wardrop, Thomas, aged 19, Glasgow M.I., Druggist's Clerk—Book-keeping (1st)
1040—Warren, William Thomas, aged 28, London M.I., Certificated Teacher—Book-keeping (1st)
555—Waters, William, aged 17, City of London College, Merchant's Clerk—Book-keeping (1st)
508—Watson, John, aged 17, Slough M.I., Assistant in Bookbinding Department, Windsor Castle—Free-hand-Drawing (3rd)
500—Watson, Joseph, aged 19, Slough M.I., Apprentice to a Law-writer—Free-hand Drawing (3rd)
1066—Watt, John Milne, aged 27, Glasgow M.I., Clerk—Book-keeping (1st); Free-hand Drawing (3rd)
565—Webster, George Gillespie, aged 16, City of London College, Scholar—Algebra (1st); Arithmetic (3rd); Latin and Roman History (3rd)
25—Webster, James, aged 22, Aberdeen M.I., Clerk—Principles of Mechanics (2nd)
568—Webster, Richard Godfrey, 18, City of London Coll., Watchmaker—Geometry (3rd)
203—Webster, William Munn, aged 19, Glasgow Athenæum, Manufacturer—French (2nd)
130—West, George, aged 18, Assistant Master—Arithmetic (3rd); Geography (2nd)
525—West, William, aged 16, Wellingborough M.I., Draper's Apprentice—Arithmetic (3rd)
916—Weston, Walter, aged 24, Messrs. Chance's Library, Smethwick, Boat Builder—Arithmetic (2nd)
31—Wheeler, George, aged 17, Farnham Young Men's Inst., Pupil-teacher—Arithmetic (2nd)
739—Whitaker, Joseph, aged 28, Halifax M.I., Clerk—Music (1st), with 2nd prize
600—Whitbread, John P., aged 23, City of London College, Clerk—Book-keeping (1st)
98—White, Edwin, aged 17, Bradford M.I., Maker-up,—English History (3rd); Geography (3rd)
144—White, Henry George, aged 21, Devonport M.I., Shipwright—Geometry (1st), with 2nd prize; Trigonometry (2nd)
141—White, William Henry, aged 18, Devonport M.I., Shipwright Apprentice—Geography (2nd); English History (3rd)
296—Whitehead, William, aged 32, Leeds Young Men's Christian Assoc., Undertaker and Dealer in Sanitary Tubes—French (3rd)
901—Whitehouse, Michael James, aged 16, Messrs. Bagnall's Schools, Gold's Hill, West Bromwich, Clerk—Arithmetic (3rd)
341—Whitehouse, Henry Innes, aged 17, St. Stephens' Evening School, Pupil Teacher—Arithmetic (3rd)
541—Whitfield, John Edward, aged 17, York Inst., Engine Fitter—Arithmetic (2nd)
292—Whitley, Sarah Elizabeth, aged 17, Leeds School of Art—Free-hand Drawing (2nd)
1016—Whittaker, John, aged 17, Burnley M.I., Worker in Warehouse—Electricity, Magnetism, and Heat (3rd); English Literature (3rd)
*86—Wilkinson, Swaine, aged 21, Bradford M.I., Warehouseman—Arithmetic (2nd); Geography (1st)
973—Wilks, John, aged 29, Wolverhampton Young Men's Christian Inst., Grocer and Druggist—Chemistry (3rd)
532—Williams, John, aged 19, Wigan M.I., Colliery Clerk—Book-keeping (2nd)
803—Williams, John, aged 17, Manchester M.I., Clerk—Arithmetic (3rd); Book-keeping (2nd)
337—Williamson, Jonathan, aged 17, Liverpool Inst., Engineer—Algebra (3rd); Geometry (2nd)
705—Williamson, John, aged 23, Glasgow Inst., Wood Carver—Free-hand Drawing (2nd)
336—Williams, Thomas Smith, aged 16, Liverpool Inst., Pupil Teacher—Arithmetic (1st); English History (1st); Algebra (2nd)
650—Williamson, William, aged 25, Popular Evening Classes, Andersonian University, Glasgow, Coal Miner—Mining and Metallurgy (2nd)
1017—Williamson, William, aged 21, Burnley M.I., Mechanic—Practical Mechanics (2nd)
*620—Willway, Henry Phillips, aged 24, Dyer—Chemistry (2nd)
679—Wilson, James, aged 20, Popular Evening Classes, Andersonian University, Glasgow, Draughtsman—Mensuration (2nd)
746—Wilson, John, aged 29, Halifax W.M. Coll., Bookseller—Chemistry (3rd)
902—Wilson, Thomas, aged 17, Messrs. Bagnall's Schools, Gold's-hill, West Bromwich, Tailor—Arithmetic (3rd)
644—Wingate, David, aged 35, Popular Evening Classes, Andersonian University, Glasgow, Colliery Oversman—Mining and Metallurgy (2nd)
643—Wingate, Gabriel, aged 16, Popular Evening Classes, Andersonian University, Glasgow, Clerk—Mining and Metallurgy (2nd)
824—Winkfield, Frederick Atmore, aged 20, Manchester M.I., Valuer's Assistant—Animal Physiology (1st) with 2nd Prize
51—Wolfenden, Joshua Lord, aged 22, Bacup M.I., Weaver—Chemistry (3rd)
663—Wright, David, aged 23, Popular Evening Classes, Andersonian University, Glasgow, Railway Clerk—Logic and Mental Science (2nd)
825—Wright, Henry, aged 16, Manchester M.I., Designer—Chemistry (2nd); Animal Physiology (3rd)
405—Wright, John Thomas, Werneth M.I., Book-keeper—Arithmetic (1st); French (3rd)
351—Wright, Joseph John, aged 18, St. Thomas Charter-house Evening Classes, Assistant Master—Algebra (3rd)
943—Wright, Robert Phillips, aged 20, Stourbridge M.I., Blacksmith—Book-keeping (3rd)
*628—Wright, William, aged 20, Carlisle M.I., Draper's Apprentice—Arithmetic 2nd; Book-keeping (2nd)
804—Wood, David Williams, aged 17, Manchester M.I., Lawyer's Clerk—Arithmetic (3rd); Book-keeping (2nd)

311—Wood, James Hartley, aged 17, Leeds Young Men's Christian Association, Pupil Teacher—Arithmetic (1st); Algebra (2nd)
386—Wood, John, aged 16, Oldham Lyceum, Assistant Clerk—Algebra (3rd)
852—Wood, John, aged 27, Oldham Science School, Mechanic—Geometrical Drawing (3rd)
516—Wood, Sam, aged 17, Wakefield M.I., Book-keeper—Arithmetic (3rd); Book-keeping (3rd)
865—Wood, Thomas, aged 29, Oldham Science School, Clerk—Geometrical Drawing (3rd)
1049—Woodman, Henry, aged 19, Alton Night School, Pupil Teacher—Arithmetic (2nd); Geography (2nd); English History (3rd)
213—Woodman, Samuel James, aged 20, Gosport and Alverstoke L. and S.I., Engineer—Book-keeping (2nd); Mensuration (2nd); Trigonometry (3rd); Practical Mechanics (3rd)
235—Woods, Charles, aged 19, Ipswich W.M. Coll., Pupil Teacher—Book-keeping (3rd)
204—Wylie, Alexander, aged 23, Glasgow University and Athenæum, Student—French (2nd)
984—Wynn, William, aged 18, Wolverhampton W.M. Coll., Clerk—Arithmetic (3rd)
971—Yates, Frederick, aged 25, Wolverhampton Young Men's Christian Inst., Clerk—Arithmetic (3rd); Chemistry (3rd); Animal Phisiology (1st), with prize of books to the amount of £1
986—Yeamon, Nicholas, aged 31, Wolverhampton Working Men's Coll., Teacher—Arithmetic (2nd)
205—Young, George, aged 17, Glasgow Athenæum, Clerk—Arithmetic (2nd); Geometry (2nd)
968—Young, Hannah Eliza, aged 24, Wolverhampton Young Men's Christian Institution, School Mistress—Music (2nd); French (3rd)
279—Young, William, aged 18, Leeds School of Art, Boiler Maker—Free-hand Drawing (3rd)
*1043—Young, William, aged 30, Wilton M.I., in a Carpet Manufactory—Domestic Economy (3rd)
228—Zabell, William Frederick, aged 16, Hertford Lit. and Sci. I., Compositor—Arithmetic (1st)

Home Correspondence.

WATER SUPPLY IN SOUTH AFRICA.

Sir,—In reply to a letter on this subject, published in the *Journal* of the Society for the 29th May, I beg to state that the French Government has been for some years engaged in making artesian wells on the northern borders of the Sahara.

The experiment has been perfectly successful, some of the wells yielding a considerable amount of water.

Your correspondent will find an able and interesting notice of those works in L' Année Scientifique et Industrielle, for 1863 (a French year book of facts).

I am, &c.,

G. BARBIER.

9, St. Leonard's-terrace, Maida-hill, W., June 4.

Sir,—Your correspondent "J. F. W." (Society's *Journal*, for May 29th), will find some interesting particulars respecting Artesian Wells bored by the French engineers within the Algerian Sahara, in a volume entitled, "Algiers in 1857," by the Rev. E. W. L. Davies, published by Longman and Co., 1858.

I am, &c., W. H.

63, Oakley-square, London, N.W., June 4th, 1863.

CARBURATION OF GAS AND ATMOSPHERIC GAS.

Sir,—The fact that Mr. Lowe first suggested the saturation of coal gas with the vapour of liquid hydrocarbons, is so well known, that I should not have thought it necessary to point it out in mentioning Mansfield's method of burning hydrocarbons, that are too volatile to be burnt in a lamp; because Mansfield's object was entirely different. He expressly disclaimed the application of his method to increasing the illuminating power of coal gas, which he referred to in his specification as having been already done.

He also expressly specified the object of his method to be the preparation of a mixture of some gas or vapour with the vapour of liquid hydrocarbons, which would burn with a luminous flame, and without smoke. The principle of this method was the reduction of the proportion of carbon in the hydrocarbon material burnt, and is the direct opposite of the principle of Mr. Lowe's invention, which consists in augmenting the amount of carbon, in the material burnt, as a source of light.

Mansfield also claimed the application of atmospheric air, as a vehicle for the vapour of very volatile hydrocarbons, in such manner that the "vaporised air" might be burnt like ordinary coal gas.

This is precisely the method now proposed to be adopted by the Photogenic Gas Company, under Mongruel's patent. I am, &c.,

B. H. PAUL.

8, Gray's-inn-square, W.C.

Proceedings of Institutions.

Newport Athenæum and Mechanics' Institute.—The twenty-second annual report presented to the annual meeting, held April 21st, 1863, states that during the past year the progress of the Institute has been comparatively satisfactory; for although there has been no remarkable progress, there has been no diminution in the number of members, or any considerable want of appreciation in the advantages of the Institute. Although the number of members has not been so large as the directors could have wished—the objects of the Institution being thus attained but in a limited degree—yet they believe it may be considered firmly established, and that when the trade of the town and district shall have regained its wonted prosperity, the increase in the number of members will be proportionate thereto. The directors regret that from a variety of causes the building fund has not yet been closed; but they believe that but slight exertions in the coming year will be necessary to secure this desirable object, the balance at present required being under £30. Great improvements have been recently effected in the laying out of the ground in front of the Athenæum, and the directors recommend that during the ensuing summer the premises should undergo a thorough renovation. During the past year, with a single exception, no desire has been exhibited by the members for the formation of classes. The exception arose in the case of the elocution and discussion class, which was formed in November last, and has since met weekly. The proceedings have been carried on with much spirit and success, and the members of this class have, entirely unaided, given two public entertainments at the Town-hall; the first in aid of the Lancashire Relief Fund, realizing the sum £7 15s. 4d.; and the second in aid of the Library, realizing the sum of £6 10s. 9d. The balance in hand, as per last report, was £16 11s. 8d.; received during current year, £251 4s. 1d.—total £267 15s. 9d. The expenditure has been £247 18s. 3d., leaving a

balance in hand of £19 17s. 6d., which will cover all liabilities of the Institute. During the past year there has been an increase, though small, in the number of annual, half-yearly, and quarterly members. The average number of members per quarter is 367 for the present year, being an increase over the preceding year of 21 per quarter. The present number of members is 404. The following lectures and entertainments have been given during the past year:—Mr. H. J. Groves and party, Concert; Mr. George Grossmith, "Pickings from Pickwick;" the Cremona Musical Union, two Concerts; Mr. Basil Young, "Peep at Life;" Mr. J. K. Applebee, Elocutionary Entertainment; Mr. Henry Vincent, "American Revolution;" the Reverend Hugh Stowell Brown, "Punch;" the Rev. Dr. James, F.S.A., "The Moslems in Spain;" Mr. George Dawson, M.A., "Ill-used Men;" Miss Grace Egerton and Mr. George Case "Latest Intelligence" and "Christmas Party;" and Mrs. C. L. Balfour, "Henry VIII. and his Queens." The Directors are pleased in being able to report that the attendance has been much larger than heretofore, and the funds of the Institute have been slightly benefited. The directors have been desirous of presenting only first-class lectures and entertainments, and are pleased that the result has fully justified their expectations. The total receipts (exclusive of concert, 6th of May,) amount to £84 12s.; the fees to lecturers, and other expenses amounted to £74 19s. 4d., leaving a profit of £9 12s. 8d. The attendance has been as follows:—Members, 1,207; non-members, 408; ladies introduced, 943; total attendance at 12 lectures, 2,558, averaging 213 per lecture, which, compared with last year, shows an increase of 34 per lecture. The library now contains 3,532 volumes. The directors have expended the sum of £20 12s. 5d. in the purchase of new books, and binding periodicals, and they propose at once to vote a sum of money for the library. The number of volumes circulated has been 11,673, being an increase of 806 over last year. The average number of volumes circulated per member is 33. Several books have been kindly presented. In announcing the retirement of Mr. John Wood from the post of honorary secretary the directors desire to express the high sense they entertain of his valuable services during the seven consecutive years he has held the office.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...British Architects, 8.
R. Asiatic, 3.

Tues. ...Statistical, 8.
Ethnological, 8. Mr. John Crawfurd, "On the so-called Celtic Languages and Races."
Architectural Museum, South Kensington, 7½. Mr. Gambier Parry, "On Architecture, its Purpose and its Place among the Arts."

Wed. ...Meteorological, 7. Annual Meeting.
Geological, 8. 1. Rev. George Gordon, LL.D., and Rev. J. M. Joass, "On the Relations of the Sandstones of Cromarty with Reptilian Footprints," with an Introduction by, and communicated by, Sir R. I. Murchison, K.C.B. 2. Mr. J. Carrick Moore, F.R.S., "On Some Tertiary Shells from Jamaica," with a Note on the Corals, by Mr. P. Martin Duncan, M.B. 3. Mr. J. Denis Macdonald, F.R.S., "Description of a new Eossil *Thecidium* from the Miocene Beds of Malta." Communicated by the President. 4. Mr. J. Leckenby, "On the Sandstones aud Shales of the Oolites of Scarborough, with descriptions of new species of fossil Plants." 5. Mr. H. Seeley, "A Monograph of the Ammonites of the Cambridge Greensand." 6. M. Cornelius de Groot, "On the Geology and Mineralogy of a part of Borneo." Communicated by Sir R. I. Murchison, K.C.B.
R. Horticultural, 1. Second Great Exhibition.

Thurs...Royal, 8½.
Antiquaries, 8½.
Chemical, 8.
Numismatic, 7. Annual Meeting.
Royal Soc. Club, 6.
Linnæan, 8. 1. Mr. H. F. Blanford, "On the Relations of *Tanalia*, *Philopotamis*, and *Paludomus*." 2. Mr. F. Currey, Notes on British *Fungi*." 3. Account of the Botanical Collections made by Dr David Lyall, R.N., Naturalist to the North American Boundary Commission. 4. Mr. W. Mitten, "On *Anisostichium*, a new genus of *Musci*."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 29th*, 1863.]

Dated 16th May, 1863.

1230. J. Hinks, Birmingham— mp. in lamps.
1232. F. M. Burns, Chorlton-upon-Medlock, Lancashire—Imp. in preventing the fouling of the bottoms and sides of ships and vessels, particularly applicable to ships and vessels constructed of or sheathed with iron.
1233. W. Clark, 53, Chancery-lane—Imp. in rotary engines. (A com.)
1234. J. T. Newton, Ystalyfera, near Swansea—Imp. in machinery for planishing and rolling sheet metal.
1235. J. Gibbs, Abingdon-street, Westminster—Imp. in preparing and spinning flax and other vegetable fibres and filaments, and in machinery employed therein.
1236. W. White, Earl Shilton, Leicestershire—Imp. in machinery or apparatus for the manufacture of looped fabrics.
1238. E. B. Wilson, 5, Parliament-street, Westminster—Imp. in the manufacture of iron and other metals, and in the apparatus employed therein; parts of which are applicable for other purposes where high temperatures are employed.

Dated 18th May, 1863.

1240. E. Christmas, Watford, Hertfordshire—Imp. in carriages for common roads.
1242. H. Bennett, Wombridge Iron Works, Shropshire—Improved apparatus or mechanism to be used for facilitating the puddling of iron.
1246. S. Toy, Birmingham—Imp. in machinery for making screw rivets, nails, or pins.

Dated 19th May, 1863.

1252. F. Fenton, Mappleton, Derbyshire—Imp. in the treatment of certain vegetable fibres for the preparation of textile materials therefrom.
1256. A. Parker, Billericay, Essex—An improved apparatus for saving from destruction by fire persons and property in houses, buildings, and ships, and also for ventilating ships. (A com.)
1258. T. P. Salt, Birmingham—Imp. in the manufacture of trusses.

Dated 20th May, 1863.

1262. J. Coignard, Nantes, France—Certain imp. in sewing machines.
1264. P. Addington, Phipps-bridge, Merton, Surrey—Imp. in the manufacture of varnishes.
1266. T. Williams, 232, Bolling-street, Bowling, Bradford, and I. Naylor, 13, St. James's-square, in Horton, Bradford—Imp. in paper spools or tubes used in spinning and doubling machines.

Dated 21st May, 1863.

1270. W. Walker, Manchester—Certain imp. in looms for weaving.
1272. W. Nunn, 179, Saint George-street—Imp. in the construction of si nal lanterns or lamps.
1276. A. Thomalley, Burgh-le-Marsh, Lincolnshire—Imp. in brick kilns.
1278. E. Sonstadt, Loughborough, Leicestershire—Imp. in the manufacture and purification of the metal magnesium.
1280. J. Goodman, Blackfria s-road—Imp. in velocipedes, and in the construction of wheels for the same and other carriages.

[*From Gazette, June 5th*, 1863.]

Dated 9th March, 1863.

648. H. A. Bonneville, 24, Rue de Mont Tabor, Paris—A new aromatic vinegar for removing stains from cloth and other materials. (A com.)

Dated 2nd May, 1863.

1108. H. Myers, Rue Meslay, No. 55, Paris—A new apparatus for indicating appointments or fixed engagements.

Dated 9th May, 1863.

1168. E. R. Clark, Drayton-villa, Thistle-grove, West Brompton—An imp. in the construction of portable wine cases or bins for domestic use or export and a pic-nic chest combined.
1169. N. Legendre, 89, Chancery-lane—Imp. in the construction of scissors.

Dated 12th May, 1863.

1192. W. Whiteley, Lockwood, Yorkshire—Imp. in looms for weaving.
1197. R. A. Brooman, of 166, Fleet-street—Imp. in machinery for preparing, dressing, and winding cotton, woollen, flax, silk, and other warps. (A com.)

Dated 13th May, 1863.

1200. H. Wilde, Manchester—Imp. in electro-magnetic telegraphs.

Dated 15th May, 1863.

1226. J. Paterson, Beverley, Yorkshire—Imp. in machinery or apparatus for grinding, crushing, cleaning, and hulling or shelling various kinds of farm or vegetable produce, also applicable to the crushing or grinding of minerals and other substances.

Dated 16th May, 1863.

1228. R. Waddington, W. Waddington, and T. Waddington, Thornton-road, Bradford—Imp. in combs for combing wool by machinery.

1229. B. Browne, 49, King William-street—Imp. in the manufacture of elastic material. (A com.)
1239. J. Whitehead, Calverley, near Leeds—Imp. in motive power machinery, especially adapted for raising and forcing water and other liquids or fluids, parts of the said imp. being applicable to steam engines and other machines fitted with pistons.

Dated 18*th May*, 1863.

1241. W. Watson, Clipstone-street, Fitzroy-square—Imp. in the manufacture of bread and in apparatus used for the same.
1243. A. Heather, Devonshire House, Southsea, Hants, and J. Redfern, Cumberland road, Southsea, Portsmouth—Imp. in the construction of steam boilers for marine, locomotive, and stationary engines.
1244. B. Hebblewhite, Kingston-upon-Hull—Imp. in machinery or mills for crushing or reducing oil cake, seeds, and other substances. (A com.)
1245. R. Fenner, Red Lion-court, and W. H. Hight—Imp. in envelope folding machines.
1247. J. Beaumont, Moate, Westmeath—Imp. in condensing machines for working yarns of wool and other fibrous substances.

Dated 19*th May*, 1863.

1248. C. Barnard, J. Bishop, C. Barnard, junr., and G. Barnard, Norwich—Imp. in lawn mowing and rolling machines.
1249. S. Rhodes, Farnworth, Bolton, Lancashire—Imp. in machinery for twisting and doubling cotton, hemp, flax, and other like fibrous materials.
1250. J. Edwards, 29, Basinghall—Imp. in the permanent way of railways.
1253. R. Bunting, Sheffield—Imp. in frames, tips, and bolsters used in cutlery, and in securing handles or scales therein or thereto.
1254. H. J. Olding, Belvidere-road, Lambeth—Imp. in treating flax and other fibrous plants in order to prepare the fibres thereof for spinning, and in apparatus employed therein.
1255. J. Kelly, Brook Lodge, Roscommon, Ireland—Imp. in the preparation or treatment of peat or turf and the manufacture thereof into charcoal and other fuel, drain pipes, building and other tiles, and in apparatus used therein.
1257. L. Chandor, New York—An improved mechanical lamp.
1259. L. Chandor, New York—An imp. in lamps.
1860. W. Smith, Mauchline, Ayr, N.B.—Imp. in transferring plain or coloured prints or designs to wood or other surfaces.

Dated 20*th May*, 1863.

1261. H. Wren and J. Hopkinson, Manchester—Imp. in the construction of self-lubricatings bearing for shafts and axles.
1263. W. J. C. Lang, Kircudbright, Scotland—Imp. in the manufacture of certain articles to be used for preserving life at sea and other purposes.
1265. R. R. Jackson and W. Pemberton Blackburn—Imp. in looms for weaving.
1267. J. T. Markall, Fieldgate-street, Whitechapel—Imp. in machinery for working of wood.

Dated 21*st May*, 1863.

1268. J. Cassell, La Belle Sauvage-yard, Ludgate-hill—Imp. in the treatment of mineral oils and hydrocarbons. (A com.)
1269. G. R. Harding, Wandsworth—Imp. in the means of transmitting power on railways worked by vacuum or the pressure of air, and in the apparatus to be employed for such purpose.
1271. J. Steart, 5, St. James's-road, Bermondsey—Extricating the fibre from zostera marina and other aquatic vegetable productions.
1275. N. J. Amies, Manchester—Certain imp. in the manufacture of elastic webbing.
1277. W. H. Clapp, North-place, Ball's Pond-road—An improved rail or holder for coats or other articles.
1279. J. Fawcett, Huddersfield—Imp. in the preparation of food for cattle, horses, and other animals.

Dated 22*nd May*, 1863.

1283. C. Maschwitz, jun., Birmingham—Imp. in stoppers or bungs for closing or stopping bottles, jars, and other vessels and the muzzles of rifles, and for other like purposes. (A com.)
1284. T. A. Blakely, Montpelier-square—Imp. in ordnance.
1285. J. J. Habershon, J. M. Habershon, and M. A. Habershon, Rotherham—Imp. in machinery for rolling, polishing, straightening, and tapering round rods or bars of iron, steel, and other metals.
1286. T. A. Blakely, Montpelier-square—A new method of rifling guns, and of forming projectiles to correspond therewith.
1287. G. Stevens, Victoria-terrace, Camberwell—Imp. in coke ovens, and in building and heating ovens or retorts for generating coal gas connected therewith.
1288. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of waterproof fabrics. (A com.)
1289. W. E. Newton, 66, Chancery lane—Improved machinery for the manufacture of waterproof fabrics. (A com.)
1290. J. Higgins and T. S. Whitworth, Salford—Imp. in machinery or apparatus for roving, spinning, or doubling cotton and other fibrous materials.
1291. A. W. Hofmann, Fitzroy-square—Imp. in preparing colouring matters for dyeing and printing.

Dated 23*rd May*, 1863.

1294. J. A. Pickering, Heath-cottage, Oatlands-park, Surrey—Imp. in covers or capsules for bottles, jars, and similar vessels.
1295. W. Cormack, Manchester—Imp. in the distillation of coal tar, tar oil, resin, resin oils, all hydro-carbons, petroleum, or other mineral or vegetable oils and spirits derived therefrom.
1296. S. E. Rosser, Northumberland-street, Strand, and J. G. Jennings, Palace-road, Lambeth—Imp. in chimneys, fire-places, stoves, and flues for warming and ventilating apartments.
1297. J. S. Bickford and G. Smith, Tuckingmill, Camborne, Cornwall—A certain new manufacture for firing explosive compounds.
1298. W. Hoey, Great George-street, Bermondsey—The preparation of a fluid for renewing the surface of japanned and enamelled leathers and cloths.
1299. J. Hopkins, Chapel-street, New Basford, Nottingham—Imp. in points and in crossings used on railways and on tramways.
1302. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of bells, and of resisting and non-cutting tools. (A com.)
1303. R. A. Brooman, 166, Fleet-street—Imp. in safety-garments. (A com.)
1305. G. Smith, Fenchurch-street—Imp. in lamps for burning hydrocarbon oils. (A com.)

Dated 25*th May*, 1863.

1306. J. Hesford, Bolton—Imp. in machinery and apparatus for stretching and drying cotton and other fabrics or materials.
1307. W. Muir, Manchester—Imp. in machinery for cutting sugar and for assorting the lumps when cut.
1309. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in the construction of carriages. (A com.)
1310. P. Leprovost, London-street, Paris—Certain imp. in carriages and vehicles for railways and other roads.
1311. E. Hunt, Glasgow—Imp. in posts or pillars for fences and gates. (A com.)
1312. G. Kottgen, Barmen, Prussia—An improved binding to be used for trimming woollen cloth garments.
1313. H. B. Girard, 11, Rue du Conservatoire, Paris—Imp. in the heating of every industrial and private apparatus by means of the oxygen and hydrogen gases combined and obtained from the decomposition of water.
1314. T. Spurrier, Mosely, Worcestershire—Imp. in the manufacture of ornamental metal cylinders.
1316. C. Hare, Norwich—Imp. in reclining and easy chairs.
1317. R. Hayward, Wapping, Middlesex—Imp. in apparatus for bottling liquids or for drawing or letting off at the same time liquids from several different casks or vessels.
1320. W. Clark, 53, Chancery-lane—Imp. in apparatus for ruling paper and other materials either alone or in combination with typographical or lithographical printing. (A com.)

Dated 26*th May*, 1863.

1321. A. Haley, Frome, Somersetshire—Imp. in jacquard looms.

Invention with Complete Specification Filed.

1341. C. F. Baxter, Boston, U. S.—A new and useful hollow elastic stopper for bottles, jugs, and other similar vessels.—28th May, 1863.

Patents Sealed.

[*From Gazette, June* 5*th*, 1863.]

June 5*th*, 1863.
3286. R. A. Brooman
3307. W. Inglis.
3313. D. Chalmers.
3317. E. Toynbee.
3318. I. Spight.
3367. A. Albini.
3452. W. Clark.
3445. J. Swainson, jun.

[*From Gazette, June* 9*th*, 1863.]

June 9*th*.
3322. R. Clark.
3330. J. Gaskell & H. Walmsley.
3338. E. Thorold.
3339. C. Corbet.
3392. S. C. Lister.
3397. W. S. Longridge.
3429. S. Russell.
3442. R. Lakin and J. Wain.
3453. C. F. Varley.
3477. J. E. Carter.
81. W. H. Moreland and J. Chappell.
99. W. E. Newton.
256. W. Clark.
308. W. E. Newton.
412. J. Morgan.
501. G. Davies.
654. Sir A. Keller.
717. G. De Laire.
765. T. G. Grant.
1020. R. Lavender.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, June* 9*th*, 1863.]

June 1*st*.
1357. C. W. Lancaster, J. Brown, and J. Hughes.
June 2*nd*.
1394. W. M. Cranston.
1406. M. Jacoby, J. Redgate, and J. Stones.
June 4*th*.
1386. F. H. Wenham.
1388. C. Stevens.
1412. A. A. Croll.
June 5*th*.
1373. C. Senior.
1391. C. Hadfield and W. A. Atkins.
1408. G. A. Waller.
1425. J. Combe.
June 6*th*.
1410. G. Kane.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, June* 9*th*, 1863.]

June 1*st*.
1310. E. Marsden.
June 2*nd*.
1358. W. E. Wiley.
1468. G. Gurney.
June 4*th*.
1473. H. H. Vivian, B. G. Herrmann, and W. Morgan
June 5*th*.
1387. J. Combe.

Journal of the Society of Arts.

FRIDAY, JUNE 19, 1863.

ANNUAL GENERAL MEETING.

The One Hundred-and-Ninth Annual General Meeting for the purpose of receiving the Council's Report, and the Treasurer's Statement of the Receipts, Payments, and Expenditure during the past year, and also for the Election of Officers, will be held (in accordance with the Bye-laws) on Wednesday, the 24th of June, at 4 o'clock p.m.

The Council venture to hope that members will evince their interest in the Society's proceedings by their attendance at the Meeting.

WOOD CARVING.

The Exhibition of specimens sent in competition for the prizes offered by the Society of Arts and the Society of Wood-Carvers, as well as of other specimens of wood-carving, is now open to members and their friends, and to members of the Society of Wood Carvers and their friends. Admission tickets may be had on application to the Secretary. The awards of the Judges will shortly be published.

PRIZES TO ART-WORKMEN FOR ART-WORKMANSHIP.

The following notice has been issued by order of the Council* :—

I. The Council of the Society of Arts hereby offer prizes to Art-workmen for the successful rendering of the undermentioned designs in the undermentioned processes of manufacture, according to the directions detailed in each case.

II. Such designs will be by artists of great reputation, to be translated into the various modes of workmanship, and photographs and castings of such designs will be sold by the Society, at the Society's House, at cost price, to persons desiring to be competitors.

III. The works to be executed will be considered to be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

IV. The exhibitors are required to state in each case the prices at which their works may be sold, or if sold previously to exhibition, at what price they would be willing to produce a copy.

V. The awards in each class will be of two grades, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the award; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

VI. The prizes will be presented publicly. Before the award is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

1. Modelling in Terra Cotta, Plaster, or Wax.
2. Repousse Work in any Metal.
3. Hammered Work, in Iron, Brass, or Copper.
4. Carving in Ivory.
5. Chasing in Metal.
6. Enamel Painting on Metal, Copper, or Gold.
7. Painting on Porcelain.
8. Inlays in Wood (Marquetry, or Buhl), Ivory or Metal.
9. Engraving on Glass.
10. Embroidery.

The Council cannot hold itself responsible for any accidents or damages of any kind, occurring at any time.

Each work must be marked with the name of the Art-workman, or, if preferred, with a cypher, accompanied by a sealed envelope, giving the name and address of the Art-workman, and delivered free of all charges, at the Society of Arts' House, John-street, Adelphi, London, W.C., on or before the 31st August, 1863.

The Council desire to remind those who propose to be competitors, that they should make known their intention before the 15th of July, and as much earlier as possible. This information is necessary to enable the Council to make suitable arrangements for the distribution of the awards.

* Copies, with detailed particulars, may be had on application to the *Secretary*.

FINANCIAL STATEMENT.

The following Statement is published in this week's *Journal*, in accordance with Sec. 42 of the Society's Bye Laws, which provides that at the Annual General Meeting "the Council shall render to the Society a full account of all their proceedings, and of the Receipts, Payments, and Expenditure during the past year; and a copy of such Statement shall be published in the *Journal* of the Society on the Friday before such General Meeting."

TREASURERS' ANNUAL STATEMENT OF RECEIPTS, PAYMENTS, AND EXPENDITURE FOR THE YEAR ENDING 30th MAY, 1863.

Dr.

	£ s. d.	£ s. d.
To Subscriptions for the year:—		
From Members and Institutions in Union with the Society...		5,683 1 6
Life Contributions...		372 16 0
To Dividends on Stock:—		
£6,530 18s. Consols...	188 11 8	
£388 1s. 4d. New 3 per Cents. ...	11 4 2	
Rs. 52,000 Indian 5 per Cent. Promissory Notes ...	256 13 0	
		456 8 10
To Interest by London and Westminster Bank ...		1 3 8
To Special Prizes:—		
Prince Consort's Prize ...	26 5 0	
Sir Wentworth Dilke, Bart. ...	9 0 0	
		35 5 0
To Sale of Books ...		60 13 10
Jury Reports ...		875 19 6
Memorial to the Prince Consort ...		641 15 0
Exhibition of 1862 ...		15 0 0
Dinner Tickets ...		211 10 0
Residue of Dr. Cantor's Estate ...		6 5 10
Art Workmanship Examples ...		6 0 0
South Australian Institute...		440 0 0
Maitland School of Arts ...		11 8 8
Examination Fees ...		9 1 0
Overpaid on Cash Account ...	0 11 0	
,, Petty Cash ...	1 9 8	
		2 0 8
		£8,828 9 6

Cr.

	£ s. d.	£ s. d.
By General Establishment Expenses:—		
Rent, Rates, and Taxes ...	191 6 0	
Insurance, Gas, Coals, and House Charges.	181 16 8	
Salaries, Wages, and Commission ...	1,651 18 3	
Postage Stamps and Carriage of Parcels.	270 7 0	
Stationery and Printing (exclusive of *Journal*) ...	330 6 11	
Advertising ...	13 17 6	
		2,639 12 4
By General Expenditure:—		
Working Classes Museum...	2 12 3	
Library ...	54 1 1	
Journal (including Stamps and Distribution) ...	1,267 3 10	
Union of Institutions, including Examinations Prizes, Postage, Stationery, Printing, &c. ...	606 17 7	
Prince Consort's Prize ...	26 5 0	
Sir Wentworth Dilke, Bart.'s, Prize ...	9 0 0	
Printing Index to *Journal*, vols. i. to x....	60 14 8	
Artistic Copyright Committee ...	1 14 3	
Three Conversazioni at South Kensington ...	514 4 11	
Dinner ...	265 7 0	
Medals ...	6 0 0	
Repairs and Alterations ...	97 2 2	
		2,911 2 9
By Special Expenditure:—		
South Australian Institute ...	436 8 2	
Central Committee of Educational Unions	13 13 8	
Art Workmanship Examples ...	7 13 6	
Wood Carving Exhibition...	0 3 6	
Committees (General) ...	24 4 4	
Annuity to Mrs. Cantor ...	25 0 0	
Jury Reports ...	36 11 0	
Memorial to the Prince Consort ...	32 14 6	
Lease of Premises (renewal of) ...	2,361 6 11	
		2,937 15 7
		£8,488 10 8
Balance ...		339 18 10
		£8,828 9 6

LIABILITIES AND ASSETS.

Dr.

	£ s. d.	£ s. d.
To Sundry Creditors, viz.:—		
To South Australian Institute ...		36 10 6
Working Classes Museum ...		80 19 2
Sir W. C. Trevelyan, Bart. ...		70 0 0
Jury Reports ...		839 8 6
Society's Memorial to the Prince Consort.		609 0 6
Financial Officer ...		2 0 8
Sundry Tradesmen ...		288 18 5
Maitland School of Arts ...		0 11 3
		1,927 9 0
By excess of Assets over Liabilities† ...		11,226 12 8
		£13,154 1 8

Cr.

	£ s. d.	£ s. d.
By Consols* ...	6,530 18 0	
New 3 per Cents. ...	388 1 4	
Indian 5 per Cent. Promissory Note ...	5,200 0 0	
		12,118 19 4
By Cash in Hand:—		
At Messrs. Coutts and Co. ...	965 2 4	
At London and Westminster Bank ...	70 0 0	
		1,035 2 4
		£13,154 1 8

Examined and found Correct,

W. B. SIMPSON, } *Auditors.*
G. D. LONGSTAFF, }
P. LE NEVE FOSTER, *Secretary.*

Society's House, Adelphi,
June 16th, 1863.

* This Stock is chargeable with a payment of £200 once in five years, in respect to the Swiney Prize, which will be next awarded in January, 1864.

† This sum does not include the value of the Society's lease and other property, or the arrears of Subscriptions now due.

COMMITTEES OF REFERENCE.

COLONIES.

The adjourned meeting of this Committee was held at the Society's House on Friday afternoon, the 11th inst., John Crawfurd, Esq., F.R.S., in the chair.

The Chairman having inquired whether any gentleman present had any propositions to submit to the Committee,

Mr. W. H. F. Elliot suggested that one mode of mutually benefiting the colonies and the mother country would be by the appointment of corresponding members of the Society in the several colonies where no such appointments had yet been made. From the last published list of the members of the Society he found that they had as corresponding members in South Australia, Capt. and Mrs. Chisholm, Dr. Milligan in Tasmania, and Mr. C. A. Wilson

in Adelaide. With the exception of these four, he believed no corresponding members existed in any of our colonies. He therefore suggested that the extension of corresponding members of the Society was a subject worthy of the consideration of the Council, and he would further suggest that any reasonable expenses incurred by colonists in collecting new indigenous productions, and forwarding them to persons appointed to receive the same in this country, and also of a proper examination into the commercial value of these products, should be reimbursed by the Society, as they could not expect that colonists, in addition to the labour of collecting the products, would be willing to incur pecuniary charges in transmitting them to this country. Having offered this suggestion, he hoped to hear the views of members of the Committee who had lived longer in the colonies than himself.

Mr. P. L. Simmonds inquired whether Mr. Elliot was prepared with the names of any residents in the colonies to recommend as corresponding members. He mentioned that there were at the present time on the Council and belonging to the Society, members of Parliament and merchants who were identified with our Australian, West Indian, Eastern, North American, and other colonies. He had no doubt the Council would be happy to carry out the suggestion of Mr. Elliot with regard to the appointment of additional corresponding members in any of the colonies where persons could be found willing to act in that capacity.

The Chairman remarked that many of the colonies had societies of their own for promoting the objects indicated by Mr. Elliot. He took the proposition of that gentleman to be, that it be recommended to the Council to increase the number of corresponding members for the colonies, in order to furnish the Society with useful information on such subjects as had been mentioned.

Dr. Milligan suggested the addition that members of the Society be requested to forward the names of such residents in the colonies as they might consider qualified for the appointment of corresponding members.

The suggestion, with the addenda proposed by Dr. Milligan, was adopted.

Mr. T. M. Mackay said, having received a circular inviting him to attend this meeting of the Committee, he took the liberty of writing to inquire what were the objects of the Committee, and, in reply, was informed that it was to elicit information from the best informed men relative to our colonies, and the best means of advancing their interests. One of the chief modes of stimulating the progress of the colonies was, he considered, by means of emigration, and he was glad to say that an important movement had recently been made in some of the Australian colonies with regard to immigration. For some years all action on the part of the various governments was almost in abeyance. Two years ago Mr. Jordan came to this country from Queensland, charged with the adminstration of colonial funds, and the promotion of emigration on the land-order system. On his arrival in England Mr. Jordan made his plan known, and it proved so acceptable to the public, that during the last two years Mr. Jordan had sent out no fewer than 11,000 emigrants to Queensland, and they were now going out to that colony at the rate of 1,000 per month.

The Chairman inquired what was the plan adopted?

Mr. Mackay replied, each emigrant going out paid his own passage, and received on his arrival a land-order for £18. It was like a note of exchange for land at the Government Land Offices. At the end of ten years an additional bonus of £12 was given, making a total equivalent to £30 in land. No doubt this system had stimulated emigration very greatly. A Land Act had been recently passed by the Colonial Legislature of Victoria, by which a portion—he believed one-third—of the Land Fund was appropriated to emigration. The Land Fund, in the first year of its establishment, amounted to £240,000, which was now lying in the treasury of Melbourne, subject to the passing of an Emigration Act, intelligence of which was expected by the next mail, appointing an Emigration Board in London to take charge of this large fund and send emigrants out to the colony.

The Chairman inquired whether this would supersede the operations of the present Emigration Commissioners in London?

Mr. Mackay said it would probably supersede them with regard to immediate action with respect to this colony, although it would not supersede the management of their subordinates in various ports. The fund he had spoken of would be administered by a Board in London, of which he believed Mr. Childers, M.P., would act as president.

The Chairman remarked that the fund under the administration of the Emigration Commissioners was furnished from the Land Fund of Australia generally.

Mr. Mackay added that hitherto each colony had acted independently in this matter. Henceforward the Victoria fund would be administered by the Victoria Emigration Board.

The Chairman apprehended that, with regard to all settlements adopting this plan, the London Emigration Commissioners would be superseded.

Mr. Mackay said no doubt that would be the case ultimately. Mr. Jordan had done his work hitherto remarkably well. In South Australia there was a movement on the part of the government, but that was in connection with the existing Emigration Commissioners. The Victoria fund was expected to amount next year to £400,000, so that with what was already in hand and prospective during the next twelvemonths, there would be the large sum of £600,000 available for emigration to Victoria alone. Mr. Mackay, speaking of the indigenous productions of Australia, stated that he had just received the manifest of the ship *Marco Polo*, informing him that that ship had amongst her cargo 29 bags of antimony ore, a large quantity of wattle bark, and 132 logs of muskwood, either from Victoria or Tasmania, a specimen of which wood he laid before the Committee. He had lately received a sample of beautiful silk, which was "grown" in Queensland by the son of Mr. Forbes. He had shown the sample to one of the principal silk brokers in London, who stated that from its having been badly wound it was not worth more than 7s. per pound, but if properly wound it would be worth from 20s. to 23s. per pound. It was, in consequence, suggested that the cocoons should be sent over, and the winding done in this country. He had communicated with persons in France with the view of sending to Queensland some persons experienced in the culture of silk.

The Chairman remarked that the question of silk from Australia of course depended upon the suitability of the climate for the growth of the mulberry tree.

Mr. A. Hodgson stated that in the average of seasons in Australia the mulberry tree would grow well, but there were in some years long seasons of drought, which would be unfavourable to the plant.

Mr. Mackay said he was under the impression that in Queensland there were periodical rains.

Mr. Hodgson remarked such was not the case, and the drought had been experienced there to as great an extent as in other parts of Eastern Australia.

The Chairman said he believed there had been a succession of seasons in which not a drop of rain had fallen in three years in New South Wales.

Mr. Mackay inquired whether there were not the regular tropical rains in that part of Australia.

Mr. Hodgson replied in the negative. There were heavy rains this time last year, followed by long drought.

After further discussion upon the climate of Australia,

Mr. Mackay said Mr. Hope, a settler in Queensland, had satisfied himself that sugar could be successfully cultivated there. He apprehended the extension of the products of our colonies was a matter which bore upon the objects of the Society, and, as such, was worthy the consideration of this Committee. This was the first attempt

that had been made to cultivate sugar in that colony. By giving publicity to these things people would be induced to think over them, and an intelligent class of young men in this country might be stimulated to go out and cultivate these new productions.

Dr. Milligan said there was one organisation which he thought this Society might undertake, that was to form an agency to which new products should be sent, with a view of ascertaining their quality and commercial value. He recollected some years ago sending to this country a barrel of the gum of the grass tree, which was sold as catechu. This would not have been the case had it been submitted to chemical examination. The sale of the gum he alluded to just paid its expenses and nothing more, but it had nothing whatever in common with catechu. It was very fragrant, and was adapted for the manufacture of pastilles. It might also be used for illuminating purposes, or for making sealing wax and varnishes.

Mr. Simmonds remarked that the gum referred to was mentioned by Mr. Fitzgerald at the first meeting of this Committee. He introduced it under another name.

The Chairman said such an agency as Dr. Milligan had suggested existed already in this Committee.

Dr. Milligan would move that the Secretary be instructed to communicate to the various corresponding members in the colonies, that the Society was prepared to receive samples of products, and to pay any reasonable expense of analysis, &c.

Mr. Mackay said he should be happy to bring specimens home by his vessels free of charge. He added that the Red Hock of Australia was as good a wine as could be drunk, and he believed a large trade was to be done in preserved fruits.

Mr. Simmonds stated that the fruits grown at present were mostly consumed in the colony. The olive might be worth attention, and no doubt there might be introduced the Japan wax tree and India oil producing trees, which would lead to large exports of vegetable oils.

Mr. Hodgson thought these meetings might be made more attractive by appointing an occasion for the discussion of Australian products only. If gentlemen in London were aware of such a meeting, he had no doubt it would be largely attended.

Mr. T. G. Taylor said, when he considered the immense good the Society of Arts had done in connexion with the late Exhibition, he believed a great amount of good might be done to our Colonies by a well constituted committee, and there were certain subjects to be discussed in a general spirit. One subject was the desirability and the best means of extending our colonies. It might at some future day be thought desirable to colonise parts of North Australia, and some of the islands of the Pacific. Another subject for consideration would be the best means of promoting the growth of cotton and other fibrous materials, and the furnishing of information to one colony of what had been done in that direction by other colonies. He thought an exaggerated idea was entertained of the amount of cotton that could be grown in Queensland, and generally as to the agricultural capabilities of that colony; and therefore the Society, by obtaining reliable information on these and other subjects, might be the means of preventing speculative losses and disasters, whilst it would stimulate the progress of good investments. Then again it occurred to him that it might be in the province of the committee to direct emigration to those quarters where it was most required. Amongst other subjects was that of semi-transportation with reference to juvenile offenders, by removing them from the contaminating influence of those who were more deeply sunk in crime, giving them educational and industrial training, and sending them out to the colonies. Another subject of great importance was that of the mail service to our colonies. The Government was anxious to have an extended postal service to Australia, and the colonists were prepared to pay liberally for a mail service across the Pacific. He thought it possible the influence of this Society might hasten that which was a necessity to all our colonies in the eastern portion of Australia. He would also further suggest that the committee might associate with its labours the formation of a colonial museum, in which their secretary would be eminently useful, and he believed the materials for such a museum could be readily obtained. He was satisfied if those interested in the colonies were aware that such a committee as this had been formed, they would bring before it questions of importance, and the interests of the colonies would be thereby greatly promoted.

The following proposition was then adopted, "That a Special Meeting of the Committee be called at an early day to take into consideration the best means of developing and improving, amongst others, the following resources of the Australian Colonies:—Mineral products; woods and barks; cotton and other fibres; sugar, coffee, and other tropical products; oils, animal and vegetable, &c."

The Committee then adjourned.

TWELFTH ANNUAL CONFERENCE.

The Twelfth Annual Conference of the Representatives of the Institutions in Union, and the Local Educational Boards, with the Council of the Society, was held at the Society's House, on Friday, the 12th inst., at 12 o'clock noon. Sir Thomas Phillips, F.G.S., Chairman of the Council, presided.

The following is a list of the Institutions and Local Educational Boards represented at the Conference, with the names of their respective representatives:—

Aldershot and Farnham District, Educational Board	Mr. Barrow Rule, Sec.
Ashford, Mechanics' Institution	Mr. Henry Whitfeld.
Banbridge (Co. Down) Literary and Mutual Improvement Society and Local Board	Lord A. Edwin Hill-Trevor, M.P., Pres. Mr. Isaac Baxter. Mr. J. E. Gray.
Banbury, Mechanics Institute and Local Board	Mr. J. H. Beale, Sec.
Birmingham, Messrs. Chance's Library and Reading-room	Mr. F. Talbot, Sec.
Blackburn, Mechanics' Institution	Mr. J. B. S. Sturdy, Mayor of Blackburn. Mr. R. Hopwood Hutchinson.
Bolton, Mechanics' Institution	Mr. E. Barlow, Pres.
Bradford, Mechanics' Institution	Mr. W. E. Forster, M.P.
Bristol, Athenæum	Mr. F. Hazeldine.
Bromsgrove, Literary and Mechanics' Institution	Mr. T. H. Galton.
Bucks and Berks, Adult Education Society	Rev. C. D. Goldie, M.A. Rev. T. Rooke, M.A.
Chelmsford, Literary and Mechanics' Institution	Mr. J. Church, C.E.
Colebrookdale, Literary and Scientific Institution	Mr. C. Crookes, Vice-Chairman.
Devonport, Mechanics' Institute and Local Board	Mr. E. St. Aubyn, jun., Pres.
Dover, Museum and Philosophical Institution	Mr. James Worsfold, Mayor of Dover, Pres.

Dudley, Mechanics' Institute	Mr. Jos. Stokes, Sec.
Gilford (Co. Down), Young Men's Mutual Improvement Society	Mr. W. R. Masaroon.
Glasgow, Institution	Mr. Alexander Craig.
,, ,, Local Board	Mr. Robt. Dalglish, M.P.
,, Mechanics' Institution	Mr. Robt. Dalglish, M.P.
Gosport & Alverstoke, Local Board	Dr. Kealey, Chairman.
Hertford, Literary and Scientific Institution and Local Board	Rev. Edwd. Bartrum, M.A.
Hitchin, Mechanics' Institute,	Mr. Jos. Pollard, Sec.
Leeds, Yorkshire Union of Mechanics' Institutes	Mr. Barnett Blake.
Lichfield, Working Men's Association	Rev. John Petit, Pres. Mr. W. Brown, V.P.
,, Free Library and Museum	Captain Dyott, Chairman.
London, City of London College	Mr. E. G. Clarke. Mr. F. Reynolds.
,, Greville House (Paddington), Working Men's Library and Reading-room	Mr. Benj. Shaw, Pres. Mr. Burch. Mr. Stubbings.
,, Hackney Working Men's Institute & Local Board	Mr. B. M. Tite, Chairman to Local Board. Mr. H. Gray, Sec. Mr. J. G. Martin. Mr. Ward Slater.
,, Lambeth Local Board	Mr. T. E. Heller.
,, Marylebone Literary and Scientific Institution	Mr. R. H. Gisburne. Mr. J. Swinburne.
,, Mechanics' Institution	Mr. S. Valentine. Mr. T. J. Pearsall, Sec.
,, ,, Local Board	Mr. T. A. Reed, Sec.
,, Metropolitan Association for the Promotion of the Education of Adults	Mr. Harry Chester. Rev. Joseph Wallis. Mr. H. H. Sales, Sec.
,, St. Stephen's Evening School	Mr. Bishop. Mr. Bragg. Mr. Cuttance. Mr. S. Elliott, Sec.
,, Walworth Literary and Scientific Institution	Mr. J. S. Noldwritt, Sec.
,, Westminster Working Men's Club and Reading-room	Mr. Doyle. Mr. Williams. Mr. Stephens, Sec.
Macclesfield, Useful Knowledge Society	Mr. W. Bullock, Chairman.
Manchester, Association of Lancashire and Cheshire Mechanics' Institutes	Mr. Councillor Rumney. Mr. David Morris.
Newport (Mon.), Athenæum and Mechanics' Institution	Sir Thomas Phillips, F.G.S., Vice-Pres.
Newport (Salop), Mechanics' Institution	Mr. H. Heane, Chairman.
Peterborough, Mechanics' Institution	Dr. H. Porter, M.D.
Richmond, Parochial Library	Mr. J. Nugent Fitch.
Salisbury, Literary and Scientific Institution	Mr. John Style, Mayor of Salisbury, Vice-Pres.
South Staffordshire Union	Lord Lyttelton. Mr. John Jones, Sec.
Sydenham and Forest-hill Institute	Mr. J. Jones Ingram, Sec.
Warrington, Mechanics' Institution	Mr. John Mills.
Wednesbury, Mechanics' Institution	Mr. Sampson Lloyd.
Whitby, Institute of Popular Arts, Science, and Literature	Mr. Edwin Cockburn.
Worcestershire Union of Educational Institutes	Rev. Wm. Walters, Sec.
Wolverhampton, Working Men's College	Mr. H. Beckett, F.G.S.
,, Young Men's Christian Institute	Mr. John Jones.

The SECRETARY read the following

REPORT

TO THE COUNCIL OF THE SOCIETY FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES, AND COMMERCE.

GENTLEMEN,—In laying before you the proceedings of the Union of Institutions, from the date of the last Conference to the present time, it is my first duty to record the success of Mr. John G. Greenhough, of the Bradford Mechanics' Institution, in obtaining a clerkship in the Privy Council Office, after a competitive examination. Mr. Greenhough, it will be remembered, obtained the Prince Consort's Prize of twenty-five guineas at the Society's Examinations last year, and it is to the kind consideration of Lord Granville, one of the Society's Vice-Presidents, who, on this occasion, as well as on previous occasions, has been always ready to promote the objects of the Society, that Mr. Greenhough was indebted for the opportunity of competing. On a former occasion I entered into the circumstances under which the Union of Institutions was formed, and the objects for which it was founded, showing how large a portion of them had been accomplished by means of the Society, and how others had, by experience, been found impracticable or unnecessary. It is, therefore, needless now to recapitulate this history. One of the great objects, however, which the Institutions and the Society had in view, indeed the main object to be accomplished, will be to assist the Institutions to "become places of systematic instruction, with systematic examinations and certificates of the results of studies." We all remember how, at the commencement of the Union, the leading feature of the Institutions was the lecture system, on which great store was set by them, and how little in the way of systematic teaching was attempted. Classes for this purpose were the exception. It was not, however, till several years after the commencement of the Union that the Institu-

tions were prepared to take advantage of the examination system, and the first year that the scheme was put forth no candidates came forward to take advantage of it. In the subsequent year, 1856, however, 52 candidates were examined, and this was increased to 220 in 1857. These examinations were held, the first in London, and the second in London and Huddersfield; but it was then found that a system which involved the candidates travelling to one, two, or three distant centres, would not offer sufficient facilities for the members of the Institutions, who could afford neither the time nor the expense which was necessarily involved in an attendance at localities distant from their homes. The Society, therefore, to give increased facilities, established the present system, by means of which any locality may afford those resident within it, the opportunity of taking advantage of the Society's examinations. Any district or place may form what is termed a Local Educational Board, and to those Boards is entrusted the management of the examinations, which are conducted upon the papers of questions set by the Society's Examiners, to whom the answers of the candidates are subsequently returned for adjudication on their merits. Under this change of system, forty Local Educational Boards were established in different parts of the kingdom, and 288 candidates were examined in 1858, and these numbers have increased gradually to 480, in 1859; 586, in 1860; 750, in 1861; 815, in 1862; and this year, 1863, the number examined is 956, of whom 793 have obtained certificates, as compared with 668 passed last year. The Local Educational Boards have increased from 40 in 1858 to 110 in the present year, of whom 95 returned 1,072 candidates as qualified for the final examinations, but only 956 attended them. The number of papers worked was 1,360 as against 1,217 last year, and these have gained certificates as follows:—228 first class; 429 second class; 442 third class, whilst the number of papers in respect of which no certificates were awarded is 261. The corresponding numbers last year were 239 first class; 372 second class; 331 third class, and 275 getting no certificate.

The subjects of examination have been distributed among the candidates in very much the same proportions as last year, though in Geometry there has been a considerable increase, the number being 40 in the place of 26. There is also a large increase in the number of those examined in Magnetism, Electricity, and Heat, viz., 31 as compared with 8 last year. Chemistry and Free-hand Drawing have had a large increase of candidates, viz., 81 against 38 in the former, and 74 against 28 in the latter.

The Candidates in Animal Physiology have considerably decreased, being 16 only in the place of 40 last year; but notwithstanding the diminished number, there have been 5 first-class certificates given, whilst none were awarded in this subject last year.

The subjects that offer attractions to but few candidates are Conic Sections, Navigation and Nautical Astronomy, Astronomy, Botany including Horticulture, and Agriculture.

The number of Prizes awarded is 51 as against 44 last year. The Prince Consort's Prize of 25 guineas, graciously continued by Her Majesty the Queen, has been gained this year by William Vaughan, of the City of London College, a clerk, aged 22, who has during the four years obtained the following Certificates:—

1860. Arithmetic—First-class.
1861. Geometry—First-class.
1862. Mensuration—First-class.
,, Book-keeping—First-class.
,, Algebra—Second-class.
1863. Trigonometry—First-class and First Prize.
,, Conic Sections—First-class and First Prize.
,, Algebra—First-class and First Prize.

The amount of the Prizes given this year is £205 5s., an increase on that awarded last year, which was £180 5s.

For the general character of the Examinations, I call attention to the remarks of the Examiners, which will be found in the Appendix to this Report.

The occupations of the various candidates are given in the following table:—

Occupations, Actual or Intended, of the 1,072 Candidates from whom Return Papers were received:—

Accountants	5	Boot-closer	1
Architects	5	,, makers	2
,, Clerks ...	2	,, and Shoe Maker .	1
Art Pupil Teachers ...	3	Brass Finisher	1
Art Students	3	,, Founder	1
Artificial Tooth Maker	1	,, Moulder	1
Assistant at Mechanics' Institution	1	Bricklayer	1
,, in Bookbinding Department, Windsor Castle ...	1	Brickmaker	1
,, in Herbarium, Kew	1	Brushmaker	1
,, in a Laboratory...	1	Builders	4
,, in an Observatory...	1	,, Clerk	1
,, Librarian ...	1	Butchers	3
Auctioneer and Surveyor	1	Cabinet-makers	7
Auctioneer's Clerks ...	2	Card-maker	1
Bakers...	3	Carpenters	6
Bill and Discount Broker	1	,, and Joiners	2
Blacksmiths	2	Carpet Manufacture, in	1
Blast Furnace Manager	1	,, Measurer ...	1
Bleachers	2	Carriage Trimmer ...	1
Boat-builder	1	Cart-wright	1
Boiler Maker	1	Cashiers	4
Book-keepers	28	Caulker	1
,, sellers	3	Chemists and Assistants	9
		,, and Druggists	7
		Civil Engineers	3
		Civil Service	3
		Clerks, Commercial, &c.	291
		,, Customs ...	1
		,, Government ...	1
		,, Insurance ...	5

,, Law	16
,, Post-office ...	3
,, Railway ...	19
,, to Surveyor of Taxes	1
,, Shipbuilder's ...	1
Cloth Dresser	1
,, Finisher	1
Clothiers	5
Coachmaker's Apprentice	1
Coach Painter	1
,, Wheelwright ...	1
Collector	1
Colliery Clerks	3
,, Management studying	2
,, Oversmen ...	2
,, Salesman ...	1
Colourist	1
Colour Makers	2
,, Mixer	1
Commercial Traveller	1
Commission Agent ...	1
Compositors	3
Confectioners	2
Core Maker	1
Crate Maker	1
Customs' Out-door Officers	2
Cutlers	2
Designer	1
Dispenser	1
Dock Porter	1
Drapers and Assistants	11
Draughtsmen	5
,, to Ordnance Survey ...	1
Dressing-case Maker ...	1
Druggists & Assistants	6
Drysalter	1
Dyers	3
Elastic Web Manufacturer	1
Electro-Gilder	1
Engineers and Apprentices	30
,, Clerk	1
,, Draughtsman	1
,, and Millwright	1
Engine Fitters	4
,, Keepers ...	2
Engraver	1
,, to Calico Printers	1
Factory Hand	1
Farmers	4
Fender Fitter	1
File Manager	1
Fisherman	1
Fitter	1
Gardeners	2
Gas meter Inspector ...	1
Gentleman's Servants .	2
Glass Cutters	3
,, Painters	2
Governesses	6
Grocers and Assistants	12
Hardwareman	1
Hosiers, &c.	4
Housekeeper	1
Inland Revenue Officers	8
Iron Founders	2
Ironmonger	1
Ironmonger's Assistant	1
Iron Turners	3
Jacquard Power-loom Tenter	1
Jewellers	2
Joiners	8
,, and Builders ...	2
,, and Model Maker	1
Labourers	2
Law Writer	1
Letter Carrier	1
,, Sorter	1
Linen Manufacturer ...	1
Lithographic Artist ...	1
,, Printer ...	1
Machine-boy	1
Machinist	1
Maker-up	1
Manufacturers	3
Mason	1
Measurers	2
Mechanics	34
Miller	1
Milliner	1
Millwrights	3
Mine Agent	1
Miners, Coal and other	9
Missionary	1
Model Makers	2
Office Boy	1
Overlookers	2
Packer	1
Paper Ruler	1
Pattern Card Maker ...	1
,, Designer ...	1
,, Makers ...	2
Pharmaceutical Pupil	1
Pianist	1
Pipe Maker	1
,, Warmer ...	1
Plumbers (Glaziers and Painters)	3
Police Constables ...	3
Printers	8
,, and Stationer	1
Printseller	1
Pupils	4
Pupil Teachers	68
Queen's Scholars ...	2
Railway Agent	1
,, Servant ...	1
Reporter	1
Saddler	1
Saddler's Ironmonger .	1
Scholar	1
Schoolmasters	14
Schoolmistress	1
Self-actor Minder ...	1
Sempstress	1
Shipwrights and Apprentices	21
Shoemakers	2
Silk Lash Maker ...	1
,, Winder	1
Slider in Machine Works	1
Smiths	2
Solicitor	1
Spinners	3
Stamper	1
Stationers	2
Stock-keeper	1
Stone Cutters	2
,, Mason	1
,, & Marble Mason	1
Store Keeper	1
Students	3
Surgeon	1
Surveyors	5
Table-blade Forger ...	1
Tailors	2
,, and Drapers ...	2
Tallow Chandler ...	1
Teachers (other than Pupil Teachers) ...	33
Time-keeper	1
Tin-plate Workers ...	2
Tin Smith	1
Tobacco Manufacturer .	1
Transcriber in Record Office	1
Traveller	1
Tutor	1
Undertaker	1
Upholsterers	2
Usher	1
Valuer's Assistant ...	1
Viewer in Iron Inspection Department, Tower of London ...	1
Warehouse Boys ..	3
,, Men ...	41
Warper	1
Watchmakers	3
Weavers	21
Weigh Agent	1
,, Clerk	1
Wheelwright	1
Whitesmith	1
Wood Carvers	
,, Turners	
Woollen Manufacturer	
Wool Sorters	8
Worker in Laboratory .	1
Wright	1
Yarn Packer	1
Undetermined, or not given	30

The list of the prizemen and successful candidates have been published in the *Journal.*

The examinations in elementary subjects for which papers are furnished by the Central Committtee of Educational Unions, were held this year on the 3rd, 4th, 5th, and 6th of March, the answers of the Candidates being looked over and the certificates awarded, as was the case last year, by the Local Examiners of the various Unions.

No very material alteration was made in the programme of these examinations. The Junior Candidates were required, as on the last occasion, to satisfy the examiners in the first four rules of arithmetic, simple and compound, and in *any two* of the three following subjects :—

A. A general knowledge of the Gospel History.

B. The rudiments of English History.

C. The rudiments of the Geography of England.

Fair writing and spelling, with good reading of a simple narrative, were required of every Candidate, and female Candidates were also examined in plain needlework.

Senior Candidates were examined in arithmetic, including the rule of three, decimal and vulgar fractions, and in *any two* of the three following subjects :—

A. The facts of St. Mark's Gospel and the Acts of the Apostles.

B. English History from the accession of James the First to the death of Anne, with the rudiments of the history from the Conquest.

C. Geography of the British Isles.

Candidates were required to exhibit in their papers a fairly good handwriting, spelling, and knowledge of grammar.

Female Candidates were required to show proficiency in needlework.

There has been an increase in the number of Candidates, as well as in the number of centres at which these examinations have been held. Last year they were held under the auspices of

five Local Unions at 44 centres; this year seven Local Unions have availed themselves of these papers, and the examinations have been held at 58 centres. The increase in the number of Candidates is also considerable; in 1862, there were 118 senior Candidates of whom 70 passed; 307 junior Candidates, of whom 157 obtained certificates, whereas this year there have been 180 senior, and 631 junior Candidates, of whom 96 and 284 respectively were passed by the Local Examiners.

The following table gives the general results of these examinations.

	Number of Centres.	Senior Candidates.		Junior Candidates.	
		Examined.	Passed.	Examined.	Passed.
Aldershot	1	2	2	3	3
Hertford	1	1	1	6	3
London (Metropolitan Association)	5	30	11	195	77
Macclesfield	1	...	...	11	3
Southern Counties Adult Educational Society ...	31	54	24	208	84
Worcestershire Union	5	9	5	42	7
Yorks (West Riding Educational Board)	14	84	53	166	107
Totals	58	180	96	631	284

The names of the successful Candidates will shortly be published in the Society's *Journal.*

It will, doubtless, appear to many that the number of Candidates that have come under the influence of the Central Committee is but small, but it must be borne in mind that the object for which it was formed is mainly to promote uniformity of action, and a fixed standard in the Elementary Examinations held by the various local bodies, and though the smallness in the number of Candidates shows that this has been attained to but a limited extent, it should be understood that the results of these Examinations must not be in any way taken as the measure of the extent of the efforts made by the Local Boards and others in various parts of the country to stimulate education by examinations of an elementary character. Many Local Boards who have been in the habit of examining Candidates on subjects of this kind prefer using their own Examination papers to availing themselves of those issued by the Central Committee, and from them (except in so far as the previous Examinations of the Society of Arts are concerned), no returns are received.

I may mention that in the autumn of last year, at a meeting held under the presidency of Vice-Chancellor Sir William Page Wood, an Association was formed, which has already been productive of much good, and which, it is hoped, will in future years largely extend its operations. It had long been felt that both in the Elementary or Previous Examinations, as well as in the more advanced, or Final Examinations, of the Society of Arts, the number of Candidates in the metropolis has always been far less than might reasonably have been expected, other great centres of industry, such as Glasgow, Leeds, Bradford, having furnished a much larger number in proportion to the population, and some special organisation for making known these Examinations and stimulating the formation of Local Boards in London appeared to be desirable. The above-mentioned Association was, therefore, formed under the title of the Metropolitan Association for Promoting the Education of Adults, its general object being to extend and apply in the metropolitan district existing means and motives for the education of adults, whether members of Institutes, pupils of evening schools, or other students.

It will be seen by the above table that although formed very recently it has already promoted the examination of a large number of Candidates in the elementary subjects, and in future years its operations will no doubt be largely extended. I may add that the objects of this Association are not confined to these Examinations. It has also induced the Bishops of London and Winchester to institute examinations in religious knowledge, and is taking other steps to promote education, but as these are matters which only indirectly concern the Conference, I will not trouble you further in reference to them.

I have the honour to be,
Gentlemen,
Your obedient servant,
P. LE NEVE FOSTER, *Secretary.*

APPENDIX.

EXAMINERS' REMARKS.

The Examiner in *Arithmetic* says:—"The marked improvement which I mentioned in connection with the papers of last year is fully sustained by those which have been sent in for the present Examination. The mechanical portion of the work has, in general, been very neatly and clearly done; while the solutions of the various questions show a highly commendable amount of skill and intelligence."

The Examiner in *Book-keeping* says:—"The number of candidates this year is higher than on any former occasion; but the average quality of the work performed is not high—neither absolutely nor as compared with the work of former years; and notwithstanding the exhibition of much careful labour, and of some excellent results, the prevailing characteristic of the year's product in this department is mediocrity."

The Examiner in *Algebra* says:—"Of the 81 candidates, three may be selected as evincing a considerable degree of mathematical power—others show very good ability. In all, thirteen have obtained first-class certificates; twenty-eight, second-class certificates; twenty-eight, third-class certificates; and twelve have failed. The general character of the answering has been creditable."

The Examiner in *Geometry* says:—"The general character of the papers I have examined is satisfactory; more of the candidates than heretofore have shown some power of solving problems; and, generally, the apprecia-

tion of the strict logical method is shown by the accuracy of most of the answers, even when few in number."

The Examiner in *Mensuration* says:—"The papers have not been so well done as last year. No candidate has obtained more than two-thirds of 'full marks,' and the number 'not passed' is larger than it ought to be. In some instances the Preliminary Examinations must have been very elementary. The simple question on Land Surveying has not been answered by half the candidates. In all cases the work by which the results are arrived at should be sent up. It is not necessary that it should be scrupulously neat, or that the rough work should be carefully transcribed."

The Examiner in *Trigonometry* says:—"The number of candidates continues to be small. Those examined this year passed very creditably—as none exhibited any glaring errors. Of the questions proposed, all but one was successfully attempted."

The Examiner in *Conic Sections* says:—"The number of candidates who have answered the questions in Conic Sections is still very small. The work, however, is so good that I cannot recommend the omission of the subject. It is evident that considerable thought and study have been bestowed on it; and this cannot be without great benefit to the candidates."

The Examiner in *Navigation and Nautical Astronomy* says:—"The number of candidates in these subjects is very small. They all of them show an intelligent knowledge of the principles and of their application. They, however, want accuracy in taking out data from the tables and Nautical Almanac. One, by taking out a wrong logarithmic sine, has brought out for the "variation" 40° instead of 20°. Another has made an error of three hours in longitude, by taking out the declination of a wrong star. Candidates cannot be too strongly impressed with the truth that in working examples in these subjects accuracy is everything. The small degree of interest excited by these—to a maritime country like ours—vital subjects, as shown by the paucity of candidates at these examinations, is distressing. Those who will be charged with the duty of navigating our ships seem too easily satisfied with acquiring a knowledge of mere rules, without enquiring into the principles on which they are grounded. Such knowledge must needs be partial and devoid of interest. The navigation schools in the United Kingdom are furnished with a staff of teachers thoroughly competent to instruct both in theory and practice, and it is much to be hoped that the fruits of their labours may become more apparent than they seem hitherto to have been."

The Examiner in the *Principles of Mechanics* says:—"Again it is my very pleasing duty to be able to report considerable improvement in the papers submitted to my notice. They are especially marked, on this occasion, by evidences of considerable acquaintance with the subjects of examination. The few who have been refused a classification this year are superior to those who were rejected last year, and the same remark may be extended to those who have obtained classification. Still I am desirous to impress upon all the candidates the necessity of seeking after greater perspicuity and method in the arrangement of their replies to the questions proposed by the Examiner, inasmuch as such an acquirement not only counts for much in an examination, but must be of great service in all their subsequent commercial or professional pursuits."

The Examiner in *Practical Mechanics* says:—"The papers are of very fair average merit, and those candidates who have experienced a disappointment in not obtaining the higher distinctions, will understand that without careful reading and study it is impossible to master the intricacies of this subject."

The Examiner in *Electricity, Magnetism, and Heat*, is happy to be able to record on the present occasion a very satisfactory progress in the study of these subjects, as shown by the increased number of candidates, and by the general character of the answers. A suggestion contained in the last report, as to the value and importance of the more practical bearings of these subjects, appears to have been not unfruitful; still electro-telegraphy does not receive the attention from students that its political and commercial importance demands. This may in some degree be due to the want of a good elementary treatise on the subject; a want that will be in a great measure satisfied by the able report of the present state of that science by Mr. Fleeming Jenkin, comprised in the Jury Report of Class XIII., in the recent International Exhibition.

The Examiner in *Astronomy* says:—"The papers this year are different from those of any preceding year. They show a somewhat extensive, and in some respects, careful reading, but they are almost totally deficient in practical application, and no attempt was made of investigation of formulæ. So far as he is able to infer, it would seem that the candidates' acquired knowledge of Astronomy has not been based upon Geometry and Trigonometry, and consequently they are unable, from the want of mathematical training, notwithstanding that they seem to have read some Algebra, to express geometrically the knowledge they have acquired, and hence the cause of the failure of practical application. He advises future candidates to study Geometry well, it will enable them to understand their work better than confining themselves to analytical reading."

The Examiner in *Chemistry* says:—"The large proportion of first class certificates awarded is an evidence of the generally high character of the answers, and I observe with particular satisfaction that those questions which relate to combining proportions by weight, or by volume, are better answered than on previous occasions. The least commendable answers are generally those relating to analytical operations, and the great majority of the candidates would be much benefited by the practical teaching of the laboratory."

The Examiner in *Animal Physiology* says:—"I am glad to be able to record a decided improvement in the character of the papers as compared with those of last year. It is satisfactory to find that the applications of Physiology to the preservation of Health, have evidently attracted the attention of the candidates; but it is necessary for them ever to bear in mind that accuracy of scientific knowledge must after all be the test in an examination. I mention this because some who have written most have not always written best. I am glad to find a smaller number of immature students in this year's list than there were last year."

The Examiner in *Botany* says:—"Answers have been sent up from but three candidates. They are all very fair and indicate considerable acquaintance with both theoretical and practical botany. None of them, however, attempt to describe the ovary and fruit of the oak and hazel, and none correctly distinguish rye from barley. I return one in the second, two in the third class.

The Examiner in *Agriculture* reports, of the single paper submitted to him, that it indicates knowledge derived from books rather than experience, and is imperfect accordingly.

The Examiner in *Mining and Metallurgy* says:—"No. 327 is an excellent paper, and the writer is evidently well acquainted with the subject. None of the others exhibit a degree of excellence worthy of special remark."

The Examiner in *Political and Social Economy* says:—"With the one rather remarkable exception, which I placed in the first class, none of the candidates appear to have studied to any purpose the subjects included under the head of Political Economy."

TABLE I.—Results of the Examination of 1863.

NAME OF LOCAL BOARD.	No. of Candidates Examined at Previous Examination by Local Board.	No. of Candidates who Passed Previous Examination by Local Board.	No. of Candidates Examined at Final Examination.	No. of Candidates who Passed at Final Examination.	No. of Papers Worked at Final Examination.	No. of First-class Certificates awarded.	No. of Second-class Certificates awarded.	No. of Third-class Certificates awarded.	No. of Prizes awarded to Candidates.	No. of Unsuccessful Candidates.
Aberdeen	34	19	23	22	31	4	10	13	1	1
Accrington	10	8	7	7	7	3	3	1	...	...
Aldershot	10	9	8	8	16	2	6	6	1	...
Ashford	3	3	3	3	3	2	1	...	1	...
Bacup	22	22	19	16	32	2	5	15	...	3
Banbridge (Ireland)	7	7	5	3	8	...	2	4	...	2
Banbury	10	6	7	7	9	2	2	5	...	...
Barnet	1	1	3	3	4	...	3	1	...	...
Belfast	6	6	5	4	6	...	2	2	...	1
Birmingham and Midland	6	6	7	3	8	2	1	1	...	4
Bradford	12	10	19	17	39	4	11	16	...	2
Bristol	10	8	10	10	11	4	5	2	1	...
Burnley (East Lancashire Union) ...	16	16	20	18	36	6	14	8	...	2
Bury (Lancashire)	4	4	5	3	5	...	2	1	...	2
Bury St. Edmund's	2	1	1	1	2	...	1	1	...	...
Carlisle (Church of England Inst.) ...	1	1	1	...	1	...	...	...	...	1
,, (Mechanics' Institution)	4	4	5	3	8	...	3	1	...	2
Chelmsford...	12	11	14	9	15	2	1	7	...	5
Darlington	9	8	5	5	5	3	2	...	1	...
Deptford	8	4	5	5	9	1	3	5	...	...
Derby	2	2	2	2	2	...	1	1	...	...
Devonport	7	6	20	20	40	1	19	10	4	...
Farsley	3	2	2	...	2	...	...	...	...	2
Faversham	2	2	2	2	2	...	2	...	...	...
Gilford (Ireland)	7	7	4	3	5	1	2	1	1	1
Glasgow (Popular Evening Classes, Andersonian University)	44	39	45	40	53	10	19	14	5	5
,, (Athenæum)	47	45	39	37	45	7	23	11	4	2
,, (Institution)	47	42	30	28	43	10	16	15	1	2
,, (Mechanics' Institution)	28	26	31	27	41	12	9	13	...	4
Gosport and Alverstoke (Literary and Scientific Institution)	5	5	5	5	16	1	9	5	...	...
Halifax (Mechanics' Inst.)	6	5	7	7	8	2	6	...	1	...
,, (Working Men's College)... ...	30	18	24	24	28	5	13	9	...	...
Hartlepool (West)	1	1	...	...	...	...	...	...	...	...
Hertford	5	5	10	9	16	1	8	5	...	1
Hitchin	2	2	3	2	4	1	1	...	1	1
Idle (Yorkshire Union)	3	3	3	3	6	...	3	3	...	...
Ipswich	15	15	13	11	19	6	4	6	...	2
Leeds (West Riding Union of Institutions) ...	41	40	45	29	58	2	17	21	1	16
,, (Young Men's Christian Association) ...	11	11	17	17	24	7	10	7	1	...
Leicester (Church of England Inst.) ...	8	8	12	11	20	3	10	5	1	1
Lichfield	2	2	3	2	4	...	2	1	...	1
Liverpool	7	6	11	9	28	9	13	2	2	2
London (City of London College)... ...	38	36	58	56	86	39	20	22	10	2
,, (Mechanics' Institution)	23	14	19	18	33	11	10	8	4	1
,, (Polytechnic Inst.)	12	12	10	10	11	4	5	2	1	...
,, (St. Stephen's, Westminster) ...	6	6	10	9	13	1	5	5	...	1
,, (St. Thomas, Charterhouse) ...	8	8	12	9	22	1	5	7	...	3
,, (St. James's, Westminster) ...	11	9	4	4	12	...	3	7	...	...
,, (Hackney Working Men's Inst.) ...	11	8	3	2	4	...	3	...	...	1
Louth	2	2	2	2	5	2	2	1	...	...
Macclesfield...	9	5	5	2	6	...	...	3	...	3
Manchester	53	42	49	44	61	10	18	22	2	5
Middlesbro'...	10	10	9	8	11	1	2	7	...	1
Newcastle-on-Tyne (Mechanics' Inst.) ...	7	7	4	4	8	2	1	3	...	...
Oldham (Lyceum)	42	22	21	12	24	1	6	8	...	9
,, (School of Science)	54	35	32	10	32	...	...	10	...	22
Paisley	13	12	10	9	10	1	2	6	...	1
Pembroke Dock	6	6	9	9	15	2	6	5	...	...
Peterborough	1	1	3	3	8	3	3	2	...	...
Poole	3	3	2	1	3	...	...	2	...	1
Portsmouth	1	1	1	1	3	...	1	2	...	...
Richmond	4	4	5	2	6	...	1	1	...	3
Salford	25	25	24	17	28	1	5	13	...	7
Scarborough	1	1	3	3	9	2	2	4	1	...
Sheffield	6	4	16	9	18	...	5	5	...	7
Slough	10	10	10	7	12	...	1	7	...	3
Southampton	19	19	14	9	17	2	3	5	1	5
Southern Counties (Adult Educational Soc.), comprising nine centres	13	13	11	8	20	...	4	9	...	3
South Staffordshire Union, comprising thirteen centres	78	70	82	67	115	17	33	39	3	15
Thirsk	...	...	3	3	11	...	6	4	...	...
Wakefield	8	8	7	4	10	...	2	4	...	3
Wellingborough	4	4	7	7	7	...	3	4	...	...
Wigan	2	2	3	2	3	1	1	...	1	1
Worcestershire Union of Educational Institutes	2	2	2	2	5	...	2	3	...	...
York	2	2	6	5	13	2	5	4	1	1
Totals	994	849	956	793	1,360	228	429	442	51	163

TABLE II.—Number of Papers Worked in the Four last Years, with the Result of the year 1863.

SUBJECTS.	1860.	1861.	1862.	1863. No. of Papers Worked.	1863. No. of First-class Certificates.	1863. No. of Second-class Certificates.	1863. No. of Third-class Certificates.	1863. No. of Papers in respect of which no Certificates were awarded.
Arithmetic	263	336	336	358	68	106	113	71
Book-keeping	103	134	169	182	44	89	44	5
Algebra...	77	114	96	81	13	28	28	12
Geometry	27	17	26	40	7	17	7	9
Mensuration	11	43	44	42	...	10	15	17
Trigonometry	15	8	11	12	1	3	5	3
Conic Sections	5	4	2	2	1	...	1	...
Navigation, &c...	2	3	1	3	...	3	...	...
Principles of Mechanics	7	12	16	11	1	3	3	4
Practical Mechanics	7	12	15	17	2	4	10	1
Electricity, Magnetism, &c.	11	18	8	21	3	6	6	6
Astronomy	6	4	5	3	...	2	1	...
Chemistry	28	36	37	81	27	21	23	10
Animal Physiology	5	5	40	16	5	3	6	2
Botany	11	5	9	3	...	1	2	...
Agriculture	...	1	1	1	...	...	1	...
Mining and Metallurgy	...	7	17	16	2	8	6	...
Political and Social Economy ...	7	3	6	7	1	...	3	3
Domestic Economy	...	4	8	11	1	3	4	3
Geography	34	44	69	58	7	21	23	7
English History	43	46	80	71	14	16	29	12
English Literature	39	37	21	23	7	8	7	1
Logic and Mental Science	12	5	18	18	5	9	3	1
Latin and Roman History	10	22	20	16	1	5	6	4
French	69	79	80	88	6	27	33	22
German...	16	5	17	18	2	1	6	9
Free-hand Drawing	...	40	28	74	5	20	27	22
Geometrical Drawing	...	5	14	55	1	2	19	33
Music	13	30	23	32	4	13	11	4
Totals	821	1,079	1,217	1,360	228	429	442	261

The Examiner in *Domestic Economy* says :—" The number examined in this subject is again a small increase upon the preceding year; and, although only one has reached the first class, the greater part of them have shown a creditable knowledge of the subject, which may be of use to them in after life."

The Examiner in *Geography* says :—" The impression which I derive from the Examination papers of this year is favourable to the industry of the candidates. The number of failures is fewer than upon some former occasions. But it is from the evidence supplied in a large majority of the answers, of patient and thoughtful labour bestowed upon the effort to master the less attractive details of the subject, that I chiefly form my conclusions. Comparing them with my recollections of previous examinations, the papers show a clearer appreciation on the part of the writers of the meaning and purpose of geography, and a fuller determination to pay regard to its humbler elements in preference to indulgence in the mere generalities which often assume a more seductive aspect to the learner. The advance made in this regard is altogether in the right direction."

The Examiner in *English History* says :—" The papers are below the average of former years, both in the number of those that deserved to be placed high, and in the quality of those that were best comparatively. One great cause of this was that very few students had prepared their work out of the text-books recommended, and 'Creasy's Growth of the English Constitution' had been specially neglected. This omission to prepare a subject set, of course told seriously against all who had been guilty of it. Candidates will do well to remember that the object of the Examination in History is not merely to elicit a knowledge of names, or dates, and perhaps of a few trivial stories, but to test the writer's power of understanding past times as he understands his own. In such a book as the 'Student's Hume' the succession of events is given; in 'Creasy,' the structure of the Constitution is explained, with special reference to its gradual development; and as a man who knows one subject fairly well is alive to his own deficiencies in other matters, the study of a special period in some more elaborate work than a manual is always recommended. The whole benefits of this plan are lost if the Candidate confines himself to one book. Some even appeared to have prepared their work from some text-book of a slighter character than the 'Student's Hume.' In conclusion, the Examiner will only repeat what he said last year, that accuracy and thoughtfulness are the two qualities that tell most in all examinations."

The Examiner in *English Literature* says :—" No one of the candidates is equal to the best of last year, but the average is not inferior. An increasing tendency has shown itself in the candidates, during the last four years, to prefer the papers on Shakespeare and Milton, and that on the English language."

The Examiner in *Logic and Mental Science* says :—" In logic, with scarcely an exception, the candidates have

TABLE III.

This Table shows the ages of the 1,072 Candidates from whom return papers were received. Of these 956 underwent the Final Examination.

Age.	No. of Candidates.	Age.	No. of Candidates.
16	120	31	10
17	163	32	6
18	140	33	3
19	131	34	3
20	89	35	8
21	74	36	4
22	80	37	3
23	63	38	2
24	46	39	1
25	28	40	2
26	23	41	1
27	21	42	2
28	19	43	1
29	16	46	1
30	12		

acquitted themselves creditably; but they are not so well prepared on the books which they professed. On the whole, the examination has been satisfactory; indeed, highly so, when the very rare cases of failure are considered."

The Examiner in *Latin and Roman History* says:—"The work, on the whole, is not so good as it was last year. The parsing is perhaps a little better, but the translations are inferior, and the history still more so."

The Examiner in *French* says:—"I am not quite so satisfied this time with the French papers as I was last year. True, as compared with the results of four or five years ago, we are still considerably in advance, and the proportion of candidates entitled to certificates is quite as large this year, I think, as it has ever been. But the first class papers are very few, and even in those the literature and history bear decided marks of *cramming*, being wanting in originality of thought and freedom of style; whilst the translation from English into French is very unsatisfactory."

The Examiner in *German* says:—"It affords me much pleasure to be able to remark, that although I have not been able to award more than two first and one second class certificate this year, there is a decided improvement in the work upon former years. The translations from German into English were in nearly all the papers excellent; and those from English into German very promising. The weakness appeared in the composition, and the majority of candidates ventured upon writing an essay when they ought to have contented themselves with answering more of the questions, by which they would have obtained marks which they could not earn by a feeble composition. To write even decently in a foreign language demands many years of close study and practice, besides a kind of tact which is not given to every one."

The Examiner in *Free-hand Drawing* says:—"The number of candidates in this subject has been gradually increasing at each successive examination; this time the number greatly exceeded that of any former year. When the examinations were first commenced there were less than twenty candidates for two or three years; this year between seventy and eighty have sent in drawings. This great increase in the numbers is highly satisfactory, being a proof of the value that is set upon the certificates of the Society of Arts as well as showing how much drawing, as a useful art, is spreading throughout the country. Last year the drawings were better than those of any previous year, and I am glad to be able to say they have not fallen off on the present occasion."

The Examiner in *Geometrical Drawing* says:—"Misled, perhaps, by the title 'Geometrical Drawing,' the candidates appear to be not yet aware of what is expected from them. 'Practical Geometry' implies more than the application of simple deductions from the six books of 'Euclid.' The draughtsman must be able not only to draw a circle through three given points, but to determine and draw a sphere which has four given points on its surface. The constructions required by the examination paper did not require so much as this very elementary knowledge, and yet few have succeeded. There is, however, a perceptible improvement manifested in knowledge of Plane Geometry, and in neat accurate drawing."

The Examiner in the *Theory of Music* says:—"The best papers of this year are, I think, inferior to the best of last year; but the number of fairly good ones is certainly greater. It would seem that the higher branches of Musical Theory do not find an increasing number of students among our candidates, but that the rudiments are much more carefully taught than heretofore."

The Chairman introduced the first subject for discussion, which was as follows:—

"Whether in the Elementary Examinations, in addition to the uniformity already, to a great extent, secured by the supply of the same papers of questions to the various Local Boards, further uniformity may not be obtained by a plan for aiding the Local Examiners in the estimation of the Candidates' answers?"

Mr. Harry Chester rose to move that the above proposition be affirmed by the Conference. He said those present were aware of the general character of the arrangements for securing perfect fairness in conducting the Examinations, both major and minor, and this proposition related merely to the minor Examinations. Two years ago the Central Committee of Educational Unions was established for the purpose of providing uniform papers to be used in the Elementary Examinations. It was thought that considerable approach to uniformity of standard would be thus attained. The Metropolitan Association for Promoting the Education of Adults had considered the subject, and had arranged a plan by means of which those who, in the different places, performed the duties of examiners in Elementary Examinations might be enabled to arrive at a nearer approach to uniformity than was the case at present. He would ask his friend Mr. Critchett, a member of the committee of the Metropolitan Association, to read the proposals that body desired to make to this Conference. They had been considered and accepted by the Central Committee on the previous day.

Mr. Critchett said the idea spoken of was suggested some time ago by Mr. Barrow Rule; it had recently been brought before the Metropolitan Association, and there elaborated and brought into its present shape, and having been approved by the Central Committee of Educational Unions was now submitted to the Conference as follows:—

"The object of the Central Committee is to promote uniformity of action, and a fixed standard in the Elementary Examinations, held by the various bodies in connection with the Society of Arts. This has already been partially but not satisfactorily accomplished, by the preparation, for common use, of two sets of papers, one suited for Junior, the other for Senior candidates, with corresponding certificates to be awarded by the local authority under which the Examination has been conducted.

"These papers have served their purpose well, but it is to be desired that uniformity should not be confined to the questions only, but should extend to the mode of estimating the answers.

"As it is inconvenient for any central body to examine a large number of written answers, and undesirable that the responsibility of the Examination should be taken out of the hands of the local authorities, a certain amount of diversity in the mode and result of the Examination

is inevitable, and this it would be a great advantage to reduce to a *minimum.*

"The mode in which it is proposed to effect this object is to attach to special copies of the examination papers printed for the use of the examiners alone, the number of marks to be awarded for a complete answer to each question. For instance, suppose that in a paper there are twelve questions, and that the aggregate number of marks assigned to the paper is 120. The number of marks placed opposite to each question in the paper would of course depend upon its relative difficulty, and the proportion of these marks given by the examiner for the answer of any candidate would depend upon its accuracy and completeness. Thus, supposing a question perfectly answered to be worth 20 marks affixed in the examiner's copy, an examiner might award 20, 15, 12, or any less number according to the merit of the answer. It is thought that in this way the candidates all over the country, though their papers be tested by different examiners, will be placed as nearly as possible upon an equal footing. It is further suggested that no candidate should receive a certificate who does not obtain at least 30 marks in *each* paper (the whole paper being worth 120 marks,) and an aggregate of 150 marks in the three papers in which he is examined—that is to say, that 30 marks would be the minimum for a "pass" in any one subject, but that an average of 50 marks in each paper would be required to obtain a certificate, so that a candidate obtaining only 30 marks in one paper must obtain 60 in each of the others to obtain a certificate.

"The subjects of reading, writing, spelling, and needlework would still remain to be decided by the general impression in the minds of the examiners at the various centres, but it is not thought desirable to attempt to fix any number of marks as a standard of proficiency in these subjects.

"It is important that the same persons should examine *all* the candidates in any one subject at any of the several centres."

Mr. Barrow Rule (Aldershot Local Board) said this scheme was quite in accordance with the views of the board which he represented. He could say, for his own board, they would be happy to avail themselves of the scheme now suggested for the approbation of the conference.

Mr. Reynolds (City of London College) inquired whether this regulation was intended to be made compulsory, or only permissive.

Mr. Chester replied—Only permissive.

Mr. Barnett Blake (Yorkshire Union) thought the proposition recommended itself to the Conference, and he hoped the system would be adopted.

Lord Lyttelton (South Staffordshire Union) said he had had no communication with his board on this subject, but individually he approved of the proposition.

Mr. Chester moved,

"That the scheme contained in the paper read be recommended for adoption by the various Local Boards who use the papers of the Central Committee."

The resolution having been duly seconded, it was put by the Chairman, and carried *nem con.*

A conversation took place relative to the time of holding the Final Examinations next year, and various suggestions were offered, to which the Chairman promised that attention should, as far as possible, be paid.

The Chairman introduced the next subject on the paper:—

"Whether it is Desirable to Dispense with the 'Previous Examinations' in Special Subjects."

Mr. Jones (South Staffordshire Union) said, as this subject had emanated from the union he represented, he would offer a few remarks upon it. In his district great difficulty had been experienced in getting examiners in special subjects in the preliminary examinations. It had therefore been suggested by some members of the Committee that it would be advisable to dispense with the previous examinations in special subjects, making the preliminary examinations in the elementary subjects rather more stringent. It seemed to him that as they had to reject but few candidates, a great deal of unnecessary trouble was imposed for that result.

Mr. Chester said the Council had put this subject upon the paper because it was one which had been suggested for discussion, but he entertained a great objection to abandoning the previous examinations. He thought it would be a loss to the general value of the system. In the first place, it would diminish the importance and usefulness of the local boards; but the greatest reason was that he believed these examinations in special subjects were extremely valuable to the candidates themselves. It moreover tended to diminish the expense of the examinations if the candidates were sifted by the Local Boards, so that the central examiners might not be overburdened by papers which stood no chance of success. It was an advantage to young candidates who were likely to fail, to be advised that they had no chance of success; and, at the same time, it guided them in their future studies. It was already provided in the Programme that wherever a Local Board found a difficulty in getting examiners in the special subjects, an exception would be allowed in such a case. He repeated that, in his opinion, it would be disparaging to the character and usefulness of the Local Boards if the previous examinations in special subjects were given up.

Mr. E. G. Clarke (City of London College) thought, looking to the interests of the Institutions generally, it would be unwise to abandon the previous examinations in special subjects. He believed the Society of Arts was anxious to work with the candidates through the influence of the Institutions. The previous examinations not only afforded an opportunity of advising candidates, but led them to look to the Institutions as a means of getting to the Society's Examinations.

Rev. Edward Bartrum (Hertford Literary and Scientific Institution and Local Board) said he had been instructed by the body he represented to support the proposition for the abolition of the previous examinations in special subjects; chiefly on account of the difficulty experienced in obtaining examiners. In his own district only one person could be found to examine in three or four subjects; and if he had not personally undertaken a great share of the work it could not have been done. He thought it desirable that every means should be taken of lessening the labours of members of the Local Boards. The attendance for three hours superintending the Final Examinations was a very onerous duty, and he thought some relaxation of the rules on this subject might be made.

The Hon. and Rev. S. Best (Southern Counties Adult Education Society) thought the question before them was a little misunderstood. He gathered that the ground on which this proposition was based was the difficulty of finding local examiners in special subjects. It certainly threw an onus upon the Local Boards which he could see no necessity for.

Mr. Barrow Rule thought with Mr. Chester it would be injudicious to abolish the Previous Examinations in the special subjects. In his own board he had always found members willing to give their time, and with regard to the candidates, he had found some who persisted in going up for examanition although advised not to do so.

Mr. T. J. Pearsall (London Mechanics' Institution) remarked, with regard to the functions of the Local Boards, that in his opinion a large amount of their efficiency would be destroyed by abolishing the Previous Examinations.

The Chairman observed that it was not proposed to do away with the Previous Examinations, but merely that they should be limited to general subjects and not include the special subjects.

Mr. Pearsall joined in the opinion that had been expressed as to the severe task imposed upon persons in re-

maining hour after hour, for several consecutive evenings, in conducting these Examinations, and whatever they could do to lighten those labours would be a great boon.

Rev. W. Walters (Worcestershire Union of Educational Institutions) considered that by abolishing the Previous Examination in special subjects a great onus would be removed from the local secretaries. The first difficulty they experienced was in getting candidates to come forward; the next, and still greater difficulty, was to get together the managers of the Institutions, added to which was the difficulty of finding persons to examine the candidates in the special subjects. Last year in his district they had a candidate in agriculture, and though it was an agricultural locality he was unable to find an examiner; the candidate had, however, been admitted to examination.

Mr. Alexander Craig (Glasgow Institution) said the body he represented were strongly and decidedly of opinion that the Previous Examinations in special subjects should be abolished.

Mr. Reynolds agreed with the views expressed on this subject by Mr. Chester. In the City of London College they had experienced the advantages of the examinations in special subjects. It frequently happened that young men did not attend the classes they had formally joined. One candidate came forward in geometry, trigonometry, and conic sections, and when tested it was proved that he knew nothing of those subjects, and to have sent up such a candidate would have been wasting the time of the Society's examiners. Another benefit of the Previous Examinations was, that a candidate upon ascertaining his inefficiency devoted himself afresh to the subject, and ultimately obtained the Society's certificate. If a candidate was plucked in the first instance, the probability was he would never go up again.

Mr. Joseph Stokes (Dudley Mechanics' Institution) endorsed the observations made as to the desirability of lessening the labours of the local examiners. The great share of the work connected with these examinations devolved upon those who were more intimately connected with the Institutions, and the same persons had, for the most part, to conduct the entire examinations. Speaking for himself personally, he was taken out of his profession for 10 or 11 nights in a year, and had to sit for three hours of a night to conduct these examinations. The Institution he represented was of opinion that if they could lessen the labours of the local examiners it was very desirable to do so.

Lord Lyttelton was as anxious as any one to lessen the labours of the Local Boards, and was disposed to hope that this proposition might be adopted by way of experiment.

Rev. E. Bartrum suggested that it should be left optional with the Local Boards to continue the examinations in special subjects or not.

Mr. Barnett Blake thought the diversity of opinion on this point arose from representatives looking at it from different points of view. An opinion had been expressed that large towns possessed an advantage over the rural districts in the readiness with which examiners were to be procured. His own experience was quite the reverse of this, and he had found that in the country districts they had greater facilities for getting examiners. He thought that a candidate who came forward and passed in one subject could do no great harm if he went in for another, and that the Society might dispense with Previous Examinations upon all the subjects for which a candidate entered himself. He believed that out of twenty candidates not more than one or two required examination in special subjects.

Mr. F. Talbot (Messrs. Chance's Library and Reading-room) said he saw some difficulty in this question. Five years ago he sent to the Final Examinations nine candidates from the Institution of which he was Secretary, and seven of them were unsuccessful in obtaining certificates. That showed the importance of strict examination in special subjects; they had all passed the preliminary subjects very well. In course of time the South Staffordshire Union was formed, and then it was thought there would be no difficulty in examining in all the twenty-nine subjects if it were required—but a serious difficulty arose. Last year three young men were plucked in the preliminary special examinations, who would probably have got third-class certificates if they had been allowed to go in, as it was found that the examiner had set the questions on too high a standard. If that were to be often the case, he should be inclined to go with Mr. Jones in wishing the Examinations in special subjects dispensed with, but he thought it was very important, if possible, to have them continued. He did not, however, agree with Mr. Chester in the fear that gentleman had expressed, that the Local Boards throughout the country—more especially those in the manufacturing districts—would feel their position lowered by their not being asked to examine in special subjects. He (Mr. Talbot) believed they would be glad to be released from that labour; and it had occurred to him that the whole matter might be arranged in this way. The Society of Arts itself might, through its own examiners, send down a list of simple questions, just sufficient to test all the candidates throughout the country, and all the subjects might be got through in one evening, for candidates could not be examined in more than four subjects. The estimate of the answers to those questions must, of course, be fixed by the Local Boards; the papers need not be sent back to the Society for adjudication.

Mr. Chester was sorry to oppose what appeared to be the wish of a good many of the representatives present; but regarding this as a step which, if taken, would in his opinion prove the first step to the destruction of the entire system, he felt bound to oppose it as far as he could. He admitted the difficulties which had been mentioned, but the question was whether the object was not so important that it was worth overcoming these difficulties. It should be understood that the Society of Arts could not undertake to be examiners for the whole country. What they as a central body did, must be done through the agency of the Local Boards; and if the Local Boards would not do their part, the Society must give up theirs. He was perfectly well aware that there were difficulties in getting gentlemen to attend to these duties. If they could not, in some instances, be got to do that part of the work, no doubt exception could be made in such cases, and indeed this was already provided for in the Programme.

Mr. Critchett called the attention of the Conference to a clause in paragraph 13 of the Programme of Examinations, which was as follows:—"If in any case a Local Board should be unable itself to examine a candidate in a special subject, it will be sufficient if that Board notify the fact in the Form No. 4, and add therein that the Board believes the candidate to be fit to be examined in that subject by the Central Board."

Mr. Jones said one point had not been noticed, that was the want of a uniform standard in these preliminary examinations. In some cases, as had been referred to by Mr. Talbot, the examiners were very strict, and they rejected a good many candidates who might have had a chance if they had gone before the Society's Examiners. Another Board might be lax, and admit the candidates if they showed any acquaintance with the subject. Looking at these facts, some uniform standard of examination was certainly wanted—something of the character of that which had been agreed to in connection with the Central Committee.

The Chairman suggested whether the relaxation in paragraph 13 would not meet the case put by Mr. Jones.

The Chairman then put the proposition brought forward by Mr. Jones, which was lost.

Upon the subject of relaxing the regulation requiring the attendance of two examiners during the working of the papers, Mr. Chester expressed his opinion that it was desirable to adhere to the existing rule, as the value of the examinations depended upon the confidence felt in their *bonâ fide* character.

Mr. T. A. Reed (London Mechanics' Institution, Local Board) mentioned that difficulty was experienced in ob-

taining the unbroken attendance of persons for three or four hours, and suggested that relief might be afforded in the way of relay so long as two were in attendance during the whole time. He did not know whether that difficulty had been experienced by Local Boards generally, but it had been the case in the Institution he represented. He thought such a relief as he had suggested might be allowed, which would in a great measure meet the difficulty complained of, and it was the opinion of his Board that such an arrangement would be desirable.

Mr. Chester repeated that the value of the whole system depended upon the confidence that no unfairness could occur. If any question arose on any of the papers, if Mr. Reed's suggestion of relays were acted upon, there might be a difficulty in ascertaining who was present when the circumstance referred to took place.

Rev. E. Bartrum suggested that Local Boards might be authorised to appoint paid officers to watch the Examinations.

Mr. J. H. Beale (Banbury Mechanics' Institution and Local Board) confirmed the statement as to the difficulty of procuring the unbroken attendance of members of the Local Boards for the period specified. It sometimes occurred that only one candidate presented himself in a subject, and it was rather annoying for two gentlemen to sit for three hours in such a case.

The Chairman said the opinions expressed on this subject would receive every consideration.

The next question on the agenda was—

"The Propriety of the Society of Arts employing an Organising Agent to visit the various Institutions."

Lord Lyttelton said the subject had been cursorily discussed at the South Staffordshire Board, and the general impression was, that the Society of Arts ought to do as much as it could for the Institutions in Union. He had not considered the subject of organising agents sufficiently to be able to go into any details upon it; but he entertained the opinion of Sir James Shuttleworth, that it was the best machinery they could employ for stimulating local efforts. Without going into details he would say generally, he thought if this central body could employ one or more persons to visit periodically the local institutions good would result from it. He was not prepared to go further into the question beyond expressing an opinion that frequent visits from a representative of an influential body like the Society of Arts would give great encouragement to local institutions.

Mr. Jones said the matter was brought under the notice of the Committee of the South Staffordshire Union at the instance of some of the larger institutions in that Union. It was said that if they held a public meeting to promote the objects of the Institutions no representative of the Society attended and it was thought that in the distribution of the certificates, the presence of a representative of the Society would show a closer connexion between the Society and the local Institutions. The Government Department of Science and Art sent down a representative on application to assist in developing the classes; and it was thought desirable that some such system should be adopted by the Society of Arts. Science teaching having been adapted in the South Staffordshire Union, application was made to the department to send down an agent to organise the system, and a paid representative visited the various Institutions during a fortnight, for the same period in Worcestershire and during a month in Yorkshire. During those periods meetings were held in many places, and the result was the establishment of numerous science classes. The Institutions wanted some one to keep up the connection with the Society, more particularly at the annual meetings, and he believed it would strengthen the hands of the Society with the Institutions if some more intimate connection were established between them. Some gentlemen had been kind enough occasionally to pay them a visit on their personal responsibility, but that was merely an act of favour. If possible they would like to have some one whom they could ask to come down as the representative of the Society, and explain any difficulties they met with. He believed such an agency would do good—not so much in centres where Unions had been formed as in localities where the system of the Society of Arts was not known. He believed by this means more Institutions would be brought into connection with the Society of Arts, and although they might not all send candidates for examination, they would consider it an advantage to work under the prestige of the Society, and would thus be stimulated to increased efforts in their several localities. The committee of the South Staffordshire Union had not authorised him to bring this subject forward by any substantive resolution, but they were desirous of having the opinion of the representatives of other Institutions on the subject.

Mr. Stokes (Dudley Mechanics' Institution), as the representative of one of the largest Institutions in the South Staffordshire Union, said he was often asked by members what were the benefits the Institution derived from its connection with the Society, and he often felt he was not in a position to give them a complete answer to this question, and therefore he would like to see periodical visits from some gentleman connected with the Society to inform them what the Society was doing through the means of the local institutions. An agent might be appointed to a certain district, and might have a certain range of institutions committed to his care. There was one point in particular in which such a plan might be of benefit. In many institutions there were classes mainly conducted by schoolmasters and others gratuitously, but from some cause or other those classes often died out. In such cases it would be well if an agent of the Society could visit the Institutions, inquire into the working of the classes, and give suggestions which would tend to revive them.

The Chairman inquired whether it had occurred to any gentleman present what would be the number of agents required for the purposes indicated?

Mr. Theodore H. Galton (Bromsgrove Literary and Mechanics' Institution) said, besides the connection with the Society of Arts, the Worcestershire Union of Institutes provided an organiser who visited the various Institutions forming the Union, and did for them very much what it was suggested should be done by the Society for the Institutions throughout the country. He quite agreed with the remarks of Mr. Chester as to the undesirability of the Society of Arts becoming too centralising in its operations. He thought that should be avoided. It seemed to him that the proper functions of an organising agent would be to promote the formation of Unions of Institutions; and it occurred to him that the Society hitherto had dealt too much with separate Institutions, instead of with Unions of these bodies. He considered good had resulted to the Institutions themselves from having entered into Local Unions; it had given rise to a spirit of emulation amongst the different towns, and life was imparted where none existed before. He believed it would be found that there was more life in the Institutions that were connected with Unions than when they relied upon separate action. If the Society aimed at giving new life to the Institutions, the best way of doing this, in his opinion, was by encouraging Local Unions of Educational Institutions throughout the whole of England. For such a purpose an organising agent might be employed, as one individual might in course of time be able to do that; whereas, if the other plan were carried out, it would require more agents than, he thought, the Society would be able to employ.

[Sir Thomas Phillips having been called away by an engagement, the chair was taken for the remainder of the Conference by the Hon. and Rev. Samuel Best, Member of the Council.]

Mr. Chester was anxious to express his concurrence with a great deal that had fallen from the gentleman who spoke last. The Council of the Society had from the

first strongly recommended the Institutions to group themselves into provincial Unions, and he had exerted himself personally with that object. Although it was quite true the Society of Arts had no paid officer whom they had been in the habit of sending down to the anniversary meetings of provincial institutions, Sir Thos. Phillips and other members of the Council had been in the habit of accepting invitations on several of those occasions. He had himself attended the anniversary of the South Staffordshire Union, and many similar meetings of the Southern Counties Union, and elsewhere; and he was glad whenever an opportunity offered to meet the managers and members of provincial institutions. With regard to an organising agent, he agreed that it was one of the most useful offices that could be created, and he thought, in connection with the subject of local unions, it should be borne in mind that no union could be effective without its own local organiser, but no person whom the Society might appoint could supply the place of a local organising or visiting agent. At the same time he subscribed to the opinion which had been expressed as to the desirability of keeping up more closely the connection between the Society and the Institutions in Union with it. He did not go the length of the last speaker that the Society of Arts ought merely to be the centre of local unions, because he thought the more latitude that was given to the Institutions the better, and it was not intended that the Society of Arts should decline to co-operate with those Institutions which had not thought fit to join themselves into a Union. He thought the last speaker hit the point in saying that one of the most useful functions of the organising officer would be to stimulate the formation of local Unions; but after all it must be borne in mind that this was a serious question of expense. He did not know whether representatives present thought the Society was making a profit out of the subscriptions of the Institutions, but if they examined the accounts they would see that, on the contrary, it was put to heavy expense, and expended upon the Institutions more than it received from them. This Union was, however, part of the general objects. A large number of the members were deeply interested in the proceedings of the Society in regard to education, but when they were asked to appoint an officer to visit, once a year at least, all those bodies, he would ask whether those who had made the suggestion had made any estimate of the cost of so doing, and whether they could state any plan by which, in the event of the Society appointing such an officer, they could be repaid a portion of the expenses? Would it be likely to bring a larger number of Institutions into Union? That might be the result, but whatever the Council did in the matter, they must deliberate on the subject with reference to the interests of the Society itself. Many of the Institutions came in through their presidents, who were members of the Society, and these had all the advantages of the examinations without any subscription, so that what the Society got through Institutions was not a large sum. The expenses of the Examinations were very considerable, the whole staff of examiners was paid, and a large sum was given in prizes, and if the annual two guineas paid by the City of London College, for example, was compared with the sum which that Institution carried off in prizes, it would be seen that although the connection was a very agreeable one, it was not a beneficial one to the Society in a pecuniary sense.

Lord Lyttelton said the question was one of degree. He had assumed that the Society had funds at its disposal for these purposes, and if so, something might be done. He should like the meeting to hear what Mr. Buckmaster had to say upon this subject, as he imagined it was upon the pattern of what the Government had done in the Science and Art Department that they would proceed in this matter, if they acted at all. Mr. Buckmaster would tell them that his duties were not too specifically defined; he (Lord Lyttelton) did not wish such should be the case, but that such an agent if appointed should in fact be the medium of communication between the Society and the local bodies.

Mr. Benjamin Shaw (Greville House Working Men's Library) did not rise to offer any opposition to this recommendation, but he thought it was a question of great magnitude, or might become so; therefore, if any step were taken in this matter, it should be done with great caution. It appeared to him that Mr. Chester had thrown out the right view when he said that the object of the Society was to allow as much latitude as possible to the local bodies in union with it. Many of those bodies were very sensitive, and justly so. They would be reluctant to receive dictation from the central body, and though personal communication was a desirable thing, if it could be successfully accomplished, yet nothing required more careful management than personal communication. If an officer went forth to make roving suggestions, it would be a thing to be deplored. He did not think any rigid rules need be laid down for the constitution of these bodies; this must vary with the circumstances of each locality, and these were better understood by persons living on the spot than they could possibly be by the agent of a central body. He questioned whether suggestions should be given unless they were asked for, and then they should be made with moderation. He did not think such an officer should attempt to create Unions. He thought such Unions to be successful should be formed in consequence of a natural want felt in the neighbourhood; but if an agent were to go forth to stimulate the formation of Unions where there was no antecedent tendency to them, he thought more harm than good would be done. He was not so sure that Unions would be promoted if it were felt that such a step would control individual liberty of action. If a person could be sent round to supply information as to the examinations, he thought it would do good; and it might be well that reports should be made to the Council as to the state of the bodies in union, but he should be sorry to see such an officer styled an organising agent. He apprehended the duties would not be of a creative character, but rather to see what was going on and to satisfy the inquiries of those who desired further information. It might be left in the hands of the Council to consider the subject.

Mr. J. C. Buckmaster thought it desirable that he should shortly explain the conditions upon which the Department of Science and Art, with which he was connected, occasionally sent him to various parts of the country to explain the arrangements of that Department, for the more general promotion of knowledge in elementary Science and Art. In 1859 there was a minute passed by the Committee of Council on Education for the purpose of aiding instruction in elementary science. That minute comprised nineteen different branches of elementary science; and it was felt that such a minute would remain a dead letter for a number of years unless it was prominently brought under the notice of the public and the various Institutions throughout the country. Accordingly, a correspondence was immediately opened with the Secretaries of Institutions and persons engaged in instruction in elementary science; but it was at length felt that some other means of explaining the arrangements of the Department, to those who were desirous of having information, should be adopted. Accordingly a minute was passed by the Board appointing him (Mr. Buckmaster) to undertake the duty. He was styled an organising teacher; and the minute was to the effect that Institutions and places or persons desirous of having more detailed information with reference to the operations of the Departmentof Science and Art, might obtain his (Mr. Buckmaster's) services, to give such information as was necessary. It was further stated that it was expected that those Institutions which were in a condition to do so should contribute something towards his expenses; but he confessed, although he had visited a large number of Institutions, he had never yet found one sufficiently prosperous to make any contribution of the kind. He had

visited, in conjunction with Mr. Blake, several of the Institutions in Yorkshire. The Yorkshire Union had the disposal of his services to send him where they liked; so that, for the time being, he was as much the servant of that local organisation as that of the Department in London. He had also visited Worcestershire and Staffordshire in the same way, and the result was that there were at the present time no fewer than eighty-two classes in elementary science, most of them, he was happy to say, in connection with Mechanics' Institutions, and out of that number he believed he might say sixty-two were due to his own personal efforts made since the year 1860; and he doubted very much whether the same results would have been obtained in twenty years if the minute of Council had simply been passed without action having been taken upon it. With reference to the operations of this Society he had long felt that it was desirable that a similar work should be undertaken, and he felt convinced that in a pecuniary point of view the Society would rather gain than lose. He believed it would be the means of gaining a large accession of members. Having visited most of the Local Educational Unions throughout the country, he had found those most prosperous who employed some person to visit the Institutions in their Union. He thought by this means great impulse would be given to that secondary education which Mr. Chester and other gentlemen present had shown themselves so desirous of promoting.

The Chairman said Lord Lyttelton had just put into his hand the following resolution:—

"That this meeting approve of the principle of the Society employing according as it may have the means, one or more agents to visit Institutions in Union when requested by them to do so, and in order to advise and aid them in their operations."

Mr. Stokes having seconded the resolution,

Mr. Pearsall expressed his opinion that the adoption of the proposition would be productive of mischief rather than good. He thought the position of a rambling agent would prove to be a most unpleasant and unenviable one.

Mr. Heller said the principles which were involved in the statement of Mr. Buckmaster were quite true, but in the Department to which he alluded he had to deal for the most part with teachers who were paid for their work. In the present case they had to deal with persons who gave their aid voluntarily and gratuitously, and if they did away with that they would do harm to the Institutions. If they dealt with such persons as if they were paid teachers, they would commit a great error.

Mr. Chester would say, on the part of the Council, that whatever they did in this matter, it was certain they would not appoint a person to exercise authority over the Institutions, or to interfere with their action in any way.

The Chairman then put the resolution, which was carried.

Upon the next subject, viz.:—

"How Far is it Desirable and Practicable to Combine the Objects of the Working Men's Clubs—viz., Amusements, Draughts, Chess, Refreshment, &c., with the Educational Objects of Mechanics' Institutes, and Whether the Members of Institutes can be Retained During the Summer, by Providing Healthful Recreation and Studies Requiring Illustration from Nature?"

Mr. Barnett Blake moved the following resolution:—

"That the promotion of popular recreations for the working population, under the efficient organisation of a Mechanics' Institute, is not incompatible with the educational objects of the Institute, and may tend to effect a great amount of good; whilst the establishment of classes for instruction in sciences requiring illustration from nature would tend to encourage both education and amusement."

In support of it, he repeated the arguments he employed at the last conference in favour of combining recreation with instruction, as attractions to the working classes to join the Institutions, and as a means of retaining them after having joined.

The resolution having been seconded by Mr. Reynolds,

Mr. David Morris (Association of Lancashire and Cheshire Mechanics' Institutions) spoke in support of the resolution, and mentioned the attraction which the Museum at Manchester had been to the working classes of that city owing to a considerable reduction in the charge for admission on Saturday afternoons, and the giving popular explanations of the subjects exhibited.

Mr. Stephens (Westminster Working Men's Club and Reading Room) asked what was considered to be popular amusement? because there were many amusements which led the minds of men in a direction which was not beneficial to education generally.

Mr. Chester, though not enamoured with the terms of the resolution, entirely approved of the principle of it, which had already been affirmed by a previous Conference. He thought it highly desirable that Mechanics' Institutions and all similar bodies should make their local habitations as comfortable as they could to those who used them, and should offer counter attractions to those which were so readily met with in public-houses by giving them the means of obtaining refreshment in the evening, and engaging in agreeable conversation with their friends and neighbours, so as generally to combine the purposes of instruction with appliances for recreation and amusement. He could assure the meeting that the Council of the Society entirely sympathised with the object in view.

Lord Lyttelton said, as a Vice-President of the Working Men's Club and Institute Union, he could not vote against this resolution. Upon the subject of Working Men's Clubs, he was not prepared to speak positively one way or the other, but, considering the working of these clubs as far as they had gone, considering also that the objects were akin to those promoted by this Society, he thought this new institution to which he had referred might fairly ask for the cordial support of the Society of Arts. Mr. Solly, the Secretary of the Working Men's Club and Institute Union, was aware that he (Lord Lyttelton) had at first expressed some doubt whether there was room for this new organisation, but having seen the working of it he thought it was needed, and that good was to be expected from it.

It having been agreed, upon the motion of Mr. Chester, that the Rev. H. Solly, though not representing any Institution, be allowed to address the meeting,

Rev. H. Solly said he felt grateful for the courtesy extended to him. He believed that the working men's clubs might properly be embraced within the operations of this Society, but he thought that a more special and distinct organisation, such as that afforded by the society with which he was connected, was needed for their efficient development. He thought that there might be most valuable co-operation between that society and the Society of Arts. An instance of this was afforded in the exhibition of wood carving now before them. The secretary of the Wood Carvers Society wrote to him to ask in what way he thought the interests of that society could be best brought before the public, when he replied that the best way he knew of was to communicate with Mr. Chester, and through him with the Society of Arts, and the result was shown in the admirable exhibition of wood carving now before them. With reference to the combination of education and amusement, he was satisfied from his own experience it was of the highest importance. If this was not done they would find that much of their labour in the educational direction was thrown away. The main point he insisted upon was this—it was not enough to speak of providing recreation as would appear from the way in which this resolution was worded—they wanted to combine men together in societies for the promotion of their mutual well-being. Unless they gave at once the impulse and the opportunity to the working man of contributing something towards the common good, they would find these Institutions con-

stantly breaking up. The weak points of Mechanics' Institutions had been that the members joined solely with a view of doing good to themselves, and not also to promote the general good. There was not enough corporate spirit to lead them to combine in mutual brotherly fellowship. In this respect, he believed success had been achieved to a certain extent by Working Men's Clubs; and it was his opinion that the more the spirit of those clubs was infused into Mechanics' Institutions, the greater would be their success. Many persons might shine in a cricket-ground or in indoor entertainments who could not teach a class. Working Men's Clubs should not be established merely for recreation and amusement, and he believed the more Mechanics' Institutions were made to resemble them the more valuable they would be.

After a few remarks from Mr. E. G. Clarke in favour of Working Men's Clubs, and in support of amusements as a means of keeping the members of Institutions together in the summer months,

The Chairman put the resolution, which was unanimously adopted.

The next subject on the paper was—

"The Propriety of Holding one or more Meetings of the Representatives of Institutes, about the time of the Annual Conference, at the Society of Arts, for the purpose of Reading Short Papers or Essays on various Subjects of Interest."

Mr. Barnett Blake moved the following resolution:—

"That it would be desirable to hold a public meeting in London of the representatives of Institutes and others, on the day previous to that appointed for the Annual Conference of Representatives at the Society of Arts, for the reading and discussion of short papers or essays on subjects of interest to the Institutes;"

which was seconded by Mr. Sales, supported by the Rev. W. Walters, and adopted.

The next subject introduced was—

"The Expediency and Means of Establishing Competitive Exhibitions of the works of Art Workmen and Skilled Artisans."

Mr. Chester said this was a subject which appeared to him to be of great importance. Whilst they provided for examinations of the results of intellectual labour they ought also to make provision for examinations of the results of skilled manual labour, and bring before the notice of the public the real person by whom the work was executed. In the Exhibitions at Hyde-park and South Kensington, the great upholsterers and other tradesmen who employed the artisan got all the credit of those exhibitions, and the world knew nothing of the men who really did the work. In France a system had been recently established of giving medals to the workman, pointing him out as superior in his art to his fellows. Mr. Solly had been kind enough to mention his name in connection with the Society of Wood Carvers. He was obliged to that gentleman for having referred that Society to him, as it was the first time he knew of its existence, and from the communication he had with them, he learnt it was their desire to have a competitive exhibition of wood-carvings amongst the workmen themselves. They obtained the assistance of the Society of Arts, who not only appointed some of the judges, but also made a considerable grant towards the prize-fund. The result of the exhibition was now before them. In addition to this, the Society had offered various prizes for Art-workmanship, which would be competed for in an exhibition to be opened some time next October, and this had been stimulated by the principle that the man who really did the work was the proper person to be rewarded for it. He hoped the Society of Arts would be able to go somewhat further in this direction. He might add that the idea was originated by the Company of Painters' Stainers, who during the last three or four years had held exhibitions of their works in their own hall in the City, to the prize-fund of which the Society of Arts had also contributed. He would make no motion on the subject; he merely referred to it as one which it might be desirable to work out at a future period.

The next subject was:—

"Whether it would be expedient that Apprentices should be examined, at the conclusion of their term, in the Principles and Practice of their Craft or Business, and Certificates granted to them."

Mr. Barnett Blake remarked that this was a proposition for extending the list of subjects for examination in definite branches of knowledge in works of handicraft and skill, and the purport of the resolution he would propose was, that the Society should so extend the system as to include these special subjects, in which candidates might be examined in the year after the expiration of their apprenticeship. He thought the Society would be doing good service if they could see their way to allowing these subjects to be appended to the list of examinations.

The Chairman might be permitted to say that this question was suggested in consequence of a conversation he had with some persons who felt that both towards the master and apprentice there was, at the present moment, very often considerable injustice done. It frequently happened that a youth was bound apprentice to a trade, and at the end of half the term it was found that he was not in the least degree calculated for the trade he had undertaken, but having been bound apprentice he was compelled to go on through the seven years, and at the end of the time, as far as any purposes of usefulness was concerned, the time had been entirely thrown away. On the other hand the master, under such circumstances, was open to the imputation of neglecting his duty to the apprentice, when, in point of fact, the inaptitude of the individual for the trade or business was the real cause of the position in which he found himself. His (the Chairman's) own view in getting this subject placed upon the paper was to have the question ventilated before the Conference, and not with the intention of coming to any specific resolution upon it, and he adverted to it as one of the features in education which the Society of Arts might promote. He wished the whole subject to be considered by masters and apprentices, in order to see whether something could not be done to remove that which was an injustice, and very frequently a great injury to trade. Mr. Blake had put into his hands a resolution, which he would read:—

"That it be recommended to the Council of the Society of Arts to appoint Examinations and grant certificates and prizes for certain subjects requiring skill, such Examinations to be held at the same times, and under the same conditions, as those which are now held, and to be open to those who have completed their term of apprenticeship during the previous year."

The resolution having been seconded by Mr. Beale,

Mr. Chester suggested it would be better, in the present crude state of the question, to adopt the idea of the Chairman in simply bringing the subject before the notice of the Conference; and, after a short conversation, the resolution was withdrawn.

The Chairman said he thought the next subject, viz.:—

"Whether it would not be desirable for Institutions to give Testimonials to their Members, and to keep Registers of those so recommended by other Institutions,"

should be placed upon the same footing as the preceding one. His idea was that a person who was a good workman coming from Yorkshire into the south of England, or *vice versâ* was totally unknown. If he could take with him from the Institution to which he belonged in Yorkshire or Somersetshire a testimonial as to his character and his powers as a workman, he would more readily meet with employment when he got into a distant

locality, than if he entered it as a stranger without such a testimonial, and he thought this would be a privilege which the members of Institutions would appreciate.

Mr. Alexander Craig (Glasgow Institution) said the Institution he represented had for a long time past adopted the plan of giving certificates to its members under the circumstances mentioned by the Chairman.

Mr. Sales (Metropolitan Association) said, as Mechanics' Institutions included men of all kinds of trades, he did not see how they could be competent to grant testimonials of proficiency in any particular trade.

Mr. Pearsall (London Mechanics' Institution) thought that with the numerous trade guilds that existed all over the country such a plan as had been proposed was scarcely required.

Mr. Heller said every workman might not be a member of an Institution, and might be thus precluded from the privilege of obtaining work as compared with a person who was provided with a testimonial from his Institution. For his own part he thought it the most difficult question on the paper.

Mr. Barnett Blake remarked that it was to be presumed that every workman of steady habits and good character would become a member of a Mechanics' Institution, and if he carried with him a certificate that he had been a member of an institution for a certain number of years, it would be to a certain extent a testimonial of character.

After a further conversation the following resolution was moved and seconded:—

"That it would be desirable for Institutions to give Certificates to their members of their connection with the Institution, and to keep registers of those so recommended by other Institutions."

Upon a show of hands being taken, the resolution was negatived.

Mr. Chester said he was responsible for the next and concluding subject on the paper, viz.:—

"The Expediency of Holding Local Competitions in Short-hand."

This subject, he said, had been recommended to the Conference five or six years ago. The Council at the time saw practical difficulties in the way of holding Central Examinations in Short-hand, but the objection did not apply to local competition. The Metropolitan Association had passed a resolution in favour of holding competitive examinations in Phonography, and he had no doubt there would be a considerable number of candidates, from the metropolitan districts, to compete for the prizes. The plan drawn up by Mr. Reed (than whom no one was more competent to work out the details) had been approved by the Metropolitan Association, and he thought it might be adopted with advantage by Local Unions. He did not intend to move any resolution upon the subject, but wished to call the attention of the Conference to it as one deserving their consideration.

Mr. T. A. Reed supported the suggestions of Mr. Chester, and pointed out the extended uses to which short-hand was at present applied. Short-hand clerks capable of taking down letters, &c., from dictation were in great request in public and private offices, in large business firms, and in the railway offices, in one of which a large number of clerks had been stimulated to acquire that art. In Germany education in short-hand was carried to the extent of having a professor in the university of Berlin. Greater facilities existed in Germany than in this country for the acquisition of short-hand, inasmuch as in the former there were only about two systems, whereas in the latter there were two hundred systems.

Mr. Barrow Rule suggested the expediency of local examinations in penmanship.

The Chairman said, the Central Committee already required fair writing for the junior candidates, and good writing for the seniors.

Mr. Chester feared the suggestion just made would tend to perpetuate a practice which was happily dying out, viz., spending a great deal of time in fine writing, in the place of a good professional or business hand writing.

Rev. E. Bartrum said, there were two subjects which the Local Board he represented desired him to bring before the Conference. The first was the desirability of offering prizes for the elementary examinations, on the ground that small prizes in books would be more appreciated by the junior candidates than the certificates.

The Chairman said it was left to the Local Boards to do as they pleased in such matters with regard to the elementary examinations. In the Union of Institutions with which he was connected they did give prizes in the elementary examinations, and it was open to the Board whom the last speaker represented to do so if they pleased.

Mr. Chester said the Council had always been favourable to giving prizes in the elementary examinations as well as in the higher examinations, and the practice generally was to give the prizes upon the competitive principle. He was surprised to hear this question raised by the Hertford Board, because it had been their plan to give prizes, and he recollected on one occasion having contributed to the prize fund of that Board.

Rev. E. Bartrum again introduced the subject of the difficulty that was experienced in obtaining an unbroken attendance of members of the local board at the examinations during the period required by the Society's regulations, and inquired whether it was competent for the board to pay a small fee per evening to persons who were willing for such a consideration to undertake the duty of watching over the examinations.

The Chairman apprehended that was a matter in which the Society of Arts would not interfere, so long as the Local Boards were satisfied with the persons who undertook the duty.

Upon the motion of Mr. Barnett Blake, a vote of thanks to Sir Thomas Phillips and the Hon. and Rev. S. Best, for their able and courteous conduct in the chair, was passed by acclamation, and the compliment having been acknowledged, the conference separated.

EXAMINATIONS, 1863.

The following additions and alterations should be made in the List of Prizes and Certificates published in last week's *Journal*:—

Second Prize of £3 in Arithmetic, awarded to No. 884, William Ludgate Massy, aged 16, Southampton Athenæum, Clerk, instead of to No. 714, J. S. Cleland, he being a "Queen's Scholar," and therefore disqualified.

The Examiner in Algebra having placed the marks awarded to several of the Candidates in the wrong column, in making his return, the following additional Certificates are awarded in that subject;—

538—Blanshard, William Noble—Algebra (3rd)
511—Cox, Henry—Algebra (3rd)
1061—Dewar, Daniel—Algebra (3rd)
512—Dixon, A. C.—Algebra (3rd)
467—Hampson, David—Algebra (3rd)
449—Holt, Andrew—Algebra (3rd
819—Spriggs, Christopher—Algebra (3rd)
428—Marsh, William James, aged 19, Pembroke M.I., Shipwright's Apprentice—Algebra (3rd)
827—Walker, Edward, aged 19, Manchester M.I., Engineer's Draughtsman—Algebra (3rd)
1031—Walter, James, aged 25, London M.I., Carpenter—Algebra (3rd)

A third class certificate in Chemistry is awarded to No. 748, Arthur Baines Whitaker, aged 27, Halifax Working Men's College, Gas-meter Inspector, instead of to No. 749, John Spencer, who was not examined in that subject.

659—Bone, Charles Christison, aged 18 (not 24), Engineer's Apprentice (not Clerk.)

Proceedings of Institutions.

BACUP MECHANICS' INSTITUTION. — On Wednesday evening, April 29th, the annual meeting for the presentation of prizes, largely contributed by gentlemen in the locality, to the successful candidates connected with Bacup Mechanics' Institution, was held in the large hall of the Institution, and was well attended; SAMUEL HALL, Esq., occupied the chair. He said it was the second time he had had the honour to preside at the distribution of prizes, and, if possible, it gave him increased pleasure on the second occasion, because he saw the same names again appearing as successful, and they had shown greater application than on a former occasion. He felt glad that notwithstanding the present depression of trade the funds of the institution had not materially suffered, and he believed this was attributable to the good management and earnestness of its directors and officers. One of the candidates, William Lord, had been proficient in no less than seven instances, and he took the prize also at the previous examination. He had no doubt that he would reap the benefit of his attention, and it was an encouragement for other boys to do likewise. The examiners, who had been selected by the directors, were competent men, and he had no doubt they had done their best to decide as to who were entitled to receive the prizes. Some of the girls, too, had received prizes. One of them, Sarah Smith, was not able to obtain the first prize in arithmetic—although she had the largest number of marks—because she took the first prize last year. He felt sorry it should be so, but it must be according to the rules of the institution. The chairman then proceeded to give the prizes to the successful candidates as follows, the books presented being the choice of the pupils:—

FEMALES.

Elizabeth Heap—1st prize Reading—"Book of English Poetry."

M. A. Collinge—2nd prize Reading—"Lessons in Industrial Education."

Hannah Smith—2nd prize Reading, 2nd Writing, 1st Arithmetic, 1st Domestic Economy—"Woman's Sphere and Work, and Life Work."

E. A. Sharples—1st prize Writing—"Modern Cookery," by Eliza Acton.

E. A. Holgate—1st prize Arithmetic—"Lessons on Industrial Education."

Sarah Smith—2nd prize Domestic Economy—"Ashton Cottage; or, the True Faith."

MALES.

James Grime—1st prize Reading—"Morrell's English Grammar and Analysis."

John Whittaker—2nd prize Reading—"Davis's Arithmetic, parts 1 and 2."

George Fielden—1st prize Writing—"Morrell's English Grammar and Analysis."

James Tattersall—2nd prize Writing, 2nd Arithmetic—"Hughes's Geography, part 1."

Richard Hartley—1st prize Arithmetic—"Young's Arithmetic."

George William Sutcliffe—1st prize Dictation and Grammar—"Lund's Geometry as an Art; Lund's Geometry as a Science."

Richardson Ashworth—2nd prize Dictation and Grammar—"Anderton's Modern Geography," 1st section.

Henry Nuttall—1st prize Reading, 2nd Chemistry (also stands first in Geometry)—"Davis's Arithmetic and Key, &c.;" "Mensuration, Bookkeeping, and Key to do.;" Wilson's Chemistry."

John Cropper—2nd prize Reading, 2nd Arithmetic (second also in Mensuration)—"Nesbit's Mensuration."

James Morton—1st prize Writing (being the 20s. annual prize given by Dr. Worrall), 1st prize Geography—"Colenso's Algebra," "Nesbit's Mensuration," "Hughes's Geography," "Cassell's Euclid," "Curtis's History of England," "Clarke's Dictionary."

William Lord—2nd prize Writing, 1st Arithmetic, 2nd Geography, 1st Chemistry, 1st General Proficiency (first also in Algebra, and 2nd in Geometry. He took the annual guinea prize presented by S. Hall, Esq., the chairman)—"Bowdler's Family Shakspeare," "Cowper's Poetical Works," "Milton's Poetical Works," "Select English Poetry," "Book of Familiar Quotations," "Philip's Select Atlas," "Elements of Bookkeeping."

J. H. Smith—2nd prize Arithmetic—"Thompson's Seasons."

Heyworth Schofield—1st prize Dictation, Grammar, and Analysis. (He took the annual guinea prize given by H. Maden, Esq.)—"Nesbit's Mensuration," "Colenso's Algebra," "Hughes's Geography," "Clarke's Dictionary," "Professor Spalding's History of English Literature."

J. L. Wolfenden—2nd prize Dictation, Grammar and Analysis. (He took the Annual 10s. 6d. prize given by H. Maden, Esq.—Shakspeare's Works," "Cowper's Poetical Works," "Longfellow's Poetical Works."

James Pilling—1st prize English History—"Chambers's Political Economy," "Chambers's Animal Physiology," "Biographical Sketches of British Poets."

The meeting was then addressed by Mr. Robert Berry. Mr. Harrison moved a vote of thanks to the examiners, and to those gentlemen who had contributed to the prize fund. This was seconded by Mr. Shaw, and carried. Mr. Robinson, the Rev. J. Lawson, and other gentlemen addressed the meeting, which was concluded by vocal and instrumental music.

MEETINGS FOR THE ENSUING WEEK.

MON. ...R. Geographical, 9. Extra Meeting to receive Captains Speke and Grant on their return from Africa.
TUES. ...Medical and Chirurgical, 8½.
Zoological, 9.
Anthropological, 7½. Mr. W. W. Reade, "On the Bush Tribes of Equatorial Africa."
WED. ...Society of Arts, 4. Annual General Meeting.
R. Soc. Literature, 4½.
THURS... Royal Soc. Club, 6. Annual Meeting.
SAT.......Royal Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 15th May, 1863.

220. Treasury Chest—Account.
249. Distillers, &c.,—Return.
256. Coast of Ireland—Return.
261. Illicit distillation (Ireland)—Return.
119. Bill—Leases and Sales of Settled Estates Act Amendment.

Delivered on 16th and 18th of May, 1863.

138. Post Office Savings Bank—Account.
265. Bills of Exchange—Return.
266. Packet Service (Dover and Calais, &c.)—Return.
141. Education Grants—Return.
241. Lighthouses (Isle of Man)—Return.
267. Post Office Packet Service—Estimate "on Account."
268. Railway and Canal Bills—Fifth Report from General Committee.
122. Bills—District Parochial Churches (Ireland.)
123. ,, Port Erin Harbour (Isle of Man.)
129. ,, Vice Admiralty Courts.
130. ,, Dockyards Protection Act Amendment.

Delivered on 19th May, 1863.

125. ,, —Execution of Decrees.
126. ,, Costs Security.

Delivered on 20th, 21st, 22nd, 23rd, 27th, and 28th May, 1863.

227. Salmon Fisheries (Ireland)—Return.
239. Exchequer—Account.
258. Synodical Action (Ireland)—Return.
274. Pilotage—Return.
275. Victuallers' Occasional Licenses—Return.
240. East India (Army)—Return.
285. Convicts (Colonies)—Return.
276. Procession (7th March)—Returns.
293. Cotton Districts—Return.
150. Loan Societies—Abstract of Accounts.
262. Army, &c.—Account of Receipt and Expenditure.
273. Foreign Sugar—Account.
279. Thames Conservancy—Returns.
282. Malt, Barley, and Hops—Returns.
283. Public Works (Ireland)—Account.
286. Public Accounts—First Report from Committee.
288. Cotton Districts—Copy of Mr. Baker's Letter.
289. Roman Catholics and Members of the Established Church (Ireland)—Returns.

255. East India (Lieutenant Torckler)—Return.
259. Shannon Fisheries—Return.
268. Jessie Macintosh or Maclachlan—Return.
120. Bills—Weights and Measures.
137. ,, Fisheries (Ireland).
131. ,, Metropolis Turnpike Roads Acts Amendment (amended by Select Committee).
132. ,, Cayman Islands.
133. ,, London, &c., Dioceses.
134. ,, Augmentation of Benefices.
135. ,, Alkali Works Regulation.
136. ,, Corrupt Practices at Elections (Lords' Amendments).
139. ,, Vaccination (Scotland).
127. ,, Statute Labour Roads and Bridges (Scotland) (amended).
128. ,, Statute Labour Roads and Bridges (Scotland) Transfer (amended)
140. ,, Removal of Irish Poor.
Post Office—Ninth Report of the Postmaster-General.

Delivered on 29th May, 1863.

270. East India (Home Accounts)—Paper.
284. Sierra Leone (Mr. Fitzjames)—Return.
138. Bill—Civil Bill Courts (Ireland).
Turkish Finances—Reports of Lord Hobart.

Delivered on 30th May and 1st June, 1863.

235. Criminal Offenders (Scotland)—Abstract of Tables.
277. County Surveyors (Ireland)—Return.
290. Shipping—Returns.
294. Education—Paper.
29. Railway and Canal, &c., Bills (81) (1). North Eastern Railway (Hull and Doncaster Branch)—Board of Trade Supplementary Report.
298. Military Reserve Fund—Account.
302. Holyhead Harbour—Return.
303. Post Office Savings Banks—Accounts.
304. Civil Services—Supplementary Estimate (Class 1).
45(4.) Trade and Navigation Accounts (30th April, 1863).
200. Corporal Punishment—Return.
143. Bills—Passengers' Act Amendment.
141. ,, Admiralty Court (Ireland) (amended).
142. ,, Officers of Royal Naval Reserve.
Bombardment of Belgrade—Further Paper.

Delivered on 2nd June, 1863.

184. Immigration (Antigua)—Correspondence.
272. Sugar, &c.—Return.
300. Ordnance Survey—Account of Money Expended.
121. Bill—Poisoned Grain, &c., Prohibition.
Brazil (The late Reprisals)—Correspondence.

Delivered on 3rd June, 1863.

263. East India (Army)—Return.
295. Schools (Ireland)—Return.
145. Bill—Inland Revenue (as amended in Committee, on Consideration as amended, and on re-committal.)

Delivered on 4th June, 1863.

257. Diseased and Unsound Meat—Return.
306. Poor Law (Mary Brophy)—Return.
144. Bills—African Slave Trade Treaty.
146. ,, Trout, &c., Fishing (Scotland).
148. ,, Pier and Harbour Orders Confirmation (amended by the Select Committee).
Dardanelles and Alexandria Telegraph—Correspondence.

Delivered on 5th June, 1863.

281. Jersey Royal Court—Correspondence and Papers.
314. Committals, &c.—Return.
318. Meteorological Observations, &c.—Correspondence.
291. Packet Service (Dover and Calais, &c.)—Return.
147. Bill—Navy Prize Money, &c.
Customs—Seventh Report of Commissioners.

Delivered on 6th and 8th June, 1863.

307. East India (Sedashegur Harbour)—Correspondence.
308. Victoria (Salary of Governor)—Return.
312. Military Savings Banks—Account.
287. East India (Electric Telegraphs)—Return.
47 (3). Committee of Selection—Fourth Report.
313. Patriotic Fund—Third Report of the Royal Commissioners.
323. Exhibition of 1862 (Purchase of Lands and Buildings)—Correspondence.
316. Police (Scotland)—Report of the Inspector of Constabulary.
124. Bills—Election Petitions.
149. ,, Regimental Debts, &c.
151. ,, Local Government Supplemental (as amended by the Select Committee).
152. ,, Volunteers (amended).

Delivered on 9th June, 1863.

278. Customs Establishments, &c.—Return.
301. Canada (Hamilton Municipal Bonds)—Correspondence.
305. Poor Law (North Wales)—Return.
317. Thames Embankment and Metropolis Improvement Fund—Return.
325. Mhow Court Martial—Return.

Delivered on 10th June, 1863.

280. Dungeness Lighthouse—Return.
322. Clerical Magistrates—Return.
323. Exhibition of 1862 (Purchase of Lands and Buildings)—Correspondence (a corrected Copy).
154. Bill—Public Works (Manufacturing Districts).

Delivered on 11th June, 1863.

319. Carriages (Metropolis)—Return.
321. Expiring Laws—Report from Committee.
326. Kensington Gore Land and Buildings—Return.
328. Oxford University—Paper.
329. Ionian Islands—Return.
Greece—Papers (No. 2).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 5th*, 1863.]

Dated 26th May, 1863.

1322. J. Munro, Tillanburn, and R. Scott, Cambusnethan, Lanark, N. B.—Imp. in apparatus for boring, mining, and excavating, or cutting; in motive power engines; and in pressure gauges.
1323. E. K. Dutton, Stretford, Lancashire—Certain imp. in apparatus, called "gins," for cleansing seed cotton.
1324. M. Henry, 84, Fleet-street—Imp. in apparatus for raising, forcing, and moving fluids. (A com.)
1325. J. Buckingham, Launceston, Cornwall—Imp. in ploughs.
1327. W. E. Newton, 66, Chancery-lane—Certain imp. in machines for separating the fibre from the flesh of plants. (A com.)

Dated 27th May, 1863.

1329. W. Clark, 53, Chancery-lane—Imp. in offensive and defensive arms. (A com.)
1330. A. Bastow, Bradford—Imp. in looms for weaving.
1331. H. C. Coulthard, Blackburn, Lancashire—Imp. in blast engines.
1332. H. J. Kennard, 36, Great George-street, Westminster—Imp. in the construction of wrought-iron cylinders for piers or piles to bridges, viaducts, or for other foundations or structures where the sinking of cylinders is required.
1333. C. Gammon, 9, Cloak-lane—An improved spring fastening.
1334. Captain W. Palliser, Dublin—Imp. in projectiles for ordnance

Dated 28th May, 1863.

1336. W. I. Ellis, Vulcan Foundry, near Warrington, Lancashire—Imp. in steam boilers.
1338. G. Gore, Birmingham—Imp. in gas burners and in gas furnaces.
1340. H. Cartwright, Dean Broseley, Shropshire—Imp. in apparatus for steering vessels.
1342. T. Richardson, Newcastle-upon-Tyne, and R. Irvine, Musselburgh, Mid Lothian, N. B.—Imp. in treating the waste liquor obtained in the preparation of esparto grass.
1344. H. T. White, Piccadilly—Imp. in hats, caps, and other coverings for the head.
1346. R. A. Brooman, 166, Fleet-street—Imp. in paddle wheels. (A com.)

[*From Gazette, June 12th*, 1863.]

Dated 24th February, 1863.

502. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the manufacture of hats. (A com.)

Dated 27th February, 1863.

554. J. A. Coffey, 4, Providence-row, Finsbury—An improved method of, and apparatus for, controlling and facilitating locomotion whether on land or on water.

Dated 2nd April, 1863.

853. A. P. Price, 47, Lincoln's-inn-fields—Imp. in apparatus employed in the fusion, manufacture, production, and refining of metals.

Dated 6th April, 1863.

867. W. E. Gedge, 11, Wellington-street, Strand—Imp. in aerial machines. (A com.)

Dated 24th April, 1863.

1027. J. H. Johnson, 47, Lincoln's-inn-fields—A filtering apparatus for treating by pressure oils, syrups, and all sorts of liquids susceptible of filtering. (A com.)

Dated 7th May, 1863.

1143. G. Bower, St. Neot's, Huntingdonshire, and A. Dick, Alfred-street, City-road—Imp. in the purification of gas ordinarily used in illuminating, and in the reduction of ores and smelting of metals by means of such gas so purified.

Dated 9th May, 1863.

1175. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in rotatory engines. (A com.)

Dated 11th May, 1863.

1185. J. Shanks, Arbroath, Forfar, N.B.—Imp. in machinery for cutting or shearing the edges of grass or turf.

Dated 15th May, 1863.

1225. R. T. Mallet, 11, Bridge-street, Westminster—Imp. in the construction of piers, walls, and other similar structures, and of landing stages, and in the connections therewith or attachments thereto.

Dated 16th May, 1863.

1231. R. Talbot, Strand-on-the-Green, Chiswick—A folding rudder for steering barges in the river Thames or coastwise.
1237. T. C. Stretton, Old Basford, Nottinghamshire—Imp. in machinery or apparatus employed in the dressing of lace or other fabrics.

Dated 19th May, 1863.

1251. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in breech-loading fire-arms. (A com.)

Dated 21st May, 1863.

1274. E. T. Hughes, 123, Chancery-lane—Imp. in breech-loading fire-arms, and in cartridges connected with the same. (A com.)

Dated 23rd May, 1863.

1301. R. A. Brooman, 166, Fleet-street—Imp. in indicating the position of trains upon railways, and in apparatus employed therein. (A com.)
1304. F. Kingsbury, Cecil-street, Westminster—Imp. in the construction of orchestras.

Dated 25th May, 1863.

1308. G. Howell, Old Kent-road, Surrey—A new double-action self-feeding stamping, and printing machine.

Dated 29th May, 1863.

1350. W. Loeder, New Broad-street—Imp. in rails for railways. (A com.)
1352. G. H. Pierce, Plymouth—Improved apparatus for heating buildings by means of hot water.
1354. W. Green, Margaret's-place, Old Ford-road, Middlesex—Imp. in the means or method of producing black colouring matters or pigments.
1356. F. Patureau, Paris—Imp. in the manufacture of cardboard or paper boxes or receptacles.

Dated 30th May, 1863.

1358. E. P. Mosman, Enfield Highway, Middlesex—Imp. in obtaining and applying motive power.
1360. Lieut.-Colonel V. Baker, Her Majesty's 10th Hussars, Dublin—Imp. in ordnance.
1362. W. Clark, 53, Chancery-lane—Imp. in the manufacture of manure. (A com.)

Dated 1st June, 1863.

1368. J. Davey, Crafthole, Cornwall—Imp. in horse rakes.
1370. C. Belcher, Little Coxwell, Berkshire—Imp. in cutting and transplanting turf, and in apparatus to be employed therein, which apparatus is also applicable to the extraction of weeds, and to the planting of seeds, roots, sets or plants.

Dated 2nd June, 1863.

1372. J. Mellard, Rugeley, Staffordshire—Imp. in double-moulding or ridging ploughs.
1374. J. H. Brierley, 58, Aldermanbury—The application of leather in the manufacture of gentlemen's scarfs and ties.
1376. D. Wilson, Wandsworth-common, Surrey, and E. A. Cowper, 35A, Great George-street, Westminster—Imp. in presses.
1378. T. Page, Adelphi-terrace—Imp. in shoeing horses.
1382. T. Agnew, jun., Manchester—Certain imp. in apparatus for coating or covering moulded or other surfaces with certain composition or material.

Dated 3rd June, 1863.

1386. T. Claridge, Bilston—An imp. or imps. in the manufacture of spur wheels used in the construction of mill and forge gearing, and for other like purposes.
1390. J. J. McComb, Liverpool—Imp. in the construction of presses for forming bales of cotton and other materials, and in the construction of fastenings for and means of applying bands to such bales. (Partly a com.)
1392. J. Maurice, 3, Langham-place, Regent-street—Imp. in rulers or instruments for ruling, and in the mode of constructing them.

Dated 4th June, 1863.

1394. H. Rigby, Salford, Lancashire—Imp. in steam boilers and furnaces for the consumption of smoke.

Invention with Complete Specification Filed.

1418. G. W. E. Friedrich, 14, Shap-street, Kingsland-road—The manufacture of a new ink.

Patents Sealed.

[*From Gazette, June 12th*, 1863.]

June 12th.
3345. M. J. Roberts.
3353. J. McInnes and E. F. Prentiss.
3354. J. Varley and J. Crowther.
3358. J. J. Lemon.
3359. W. Smedley & A. Smedley.
3363. R. Schomburg and A. Baldamus.
3364. H. Jorns.
3368. C. Defries.
3372. J. Ramsbottom and G. Hacking.
3373. J. W. Hadwen.
3374. T. C. Barraclough.
3376. L. Latter.
3394. I. Holden.
3395. I. Holden.
3404. A. T. Blakely.
3419. J. B. Dalhoff.
3428. J. Whitley & J. W. Burton.
3462. J. H. Riddell.
3479. W. Clark.
306. T. L. Jacobs.
576. G. Haseltine.

[*From Gazette, June 16th*, 1863.]

June 16th.
3379. G. A. Huddart.
3388. J. Brierley and A. Brierley.
3390. J. Savory.
3391. J. Longland.
3398. E. B. Wilson.
3399. D. Davidson.
3402. J. B. Morrison.
3409. J. Platt and W. Richardson.
3411. F. C. Bakewell.
3414. A. S. Stocker.
3416. E. R. Dann.
3430. T. C. Hinde.
3439. W. Clark.
3463. J. H. Riddell.
3481. R. Bottomley.
3489. F. Loret.
18. W. H. Muntz.
38. H. Chamberlain.
39. D. Nevin and W. Coppin.
61. T. Aveling.
83. W. Tasker, jun.
117. J. A. Schlumberger.
201. W. Clark.
250. C. Mace.
567. J. Maxfield.
899. R. K. Penson.
1065. G. W. Fuller.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, June 16th*, 1863.]

June 9th.
1432. H. Sommelet.
June 10th.
1434. J. B. Farrar and J. Farrar.
1448. W. Spence.
1571. W. Clark.
June 11th.
1474. H. Widnell.
June 12th.
1455. I. Whitesmith & J. Steven.
1462. C. P. Coles.
1729. G. Spencer.
June 13th.
1496. E. B. Webb.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, June 16th*, 1863.]

June 8th.
1373. T. Skaife.
June 11th.
1400. C. J. Dumery.
1424. J. Davis.
June 13th.
1427. A. G. Baylis.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4561	May 30.	The Prince's Pipe or Cigar Holder	Samuel Stephen Bateson	Bolton-street, Mayfair.
4562	June 1.	Pulley for the Cords of Window and other Blinds..........	William Tonks and Sons	Birmingham.
4563	,, ,,	Portable Balloon Meat Safe	Frederick Hall..............	TheShambles,&Church-st.,Worcester.
4564	,, 2.	Insect Trap	George Lloyd	Park Glass Works, Birmingham.
4565	,, ,,	Call Bell	William Tonks and Sons	Birmingham.
4566	,, 4.	The Safety Waistbelt..........	Albert Lionel Salamons..	30A, St. Paul's Churchyard, E.C.
4567	,, 9.	Slide for Scarfs, Necklets, Bracelets, and Waist Clasps..........	Moses Levy Jacob and Lewis Woolf..........	Birmingham.

Journal of the Society of Arts.

FRIDAY, JUNE 26, 1863.

PRIZES TO ART - WORKMEN FOR ART-WORKMANSHIP.

The Council desire to remind those who propose to be competitors, that they should make known their intention before the 15th of July, and as much earlier as possible. This information is necessary to enable the Council to make suitable arrangements for the distribution of the awards. The particulars may be had on application to the Secretary.

WOOD CARVING.

The Exhibition of specimens sent in competition for the prizes offered by the Society of Arts and the Society of Wood-Carvers, as well as of other specimens of wood-carving, is now open to members and their friends, and to members of the Society of Wood Carvers and their friends. Admission tickets may be had on application to the Secretary.

The awards of the Judges will be found at page 548.

The following is a catalogue of the works exhibited :—

1. The Rose-bud, child's head in limetree—*G. Rumford*, 19, Ecclestone-street, S.W.
2. An Orator—*John Willis*, 17, Little Albany-street, Regent's-park, N.W.
3. Triumph of Love, after M'Dowell—*G. F. Bridge*, 3, Vincent-square, S.W.
4. Jesus at the House of Martha—*Horace Montford*, 21, Edward-street, Hampstead road.
5. Apollo playing to the Shepherds, alto relief, in oak —*James Meiklejohn*, 29, William-street, Regent's-park, N.W.
6. Carved Chimney Glass Frame, for gilding, in the style of Louis XIV.—*S. Lecand.*
7. Balaam rebuked—*C. J. Herly*, 2, Camden-place, South-street, Taunton.
8. Lord Lovat—*M. G. Strapp*, 15, Little Church-street, Wisbeach.
9. The Street-Sweeper—*M. G. Strapp.*
10. The Duke of Wellington—*M. G. Strapp.*
11. The World's End—*M. G. Strapp.*
12. The Itinerant Musicians—*M. G. Strapp.*
13. The Return of the Swallow—*M. G. Strapp.*
14. Oak Bracket. Price £2—*W. Winfield*, 22, Upper Charlton-street, Fitzroy-square, W.
15. Panel Ornament for Cabinet—*W. Winfield.*
16. Panel for Pilaster of a Cabinet—*J. M. Leach*, Louth, Lincolnshire.
17. Italian Pilaster Cap, walnut wood—*G. W. Collins*, 18, Grafton-road, Kentish Town, N.W.
18. Panther's Head—*Wm. Lambert*, 15, Charles-street, Portman-square, W.
19. Table Top, unfinished—*C. Bevan*, 58, South Molton-street, W.
20. Fruit, in cork—*J. Whitehouse.*

20A. Flowers, in cork—*J. Whitehouse.*

20B. Tam O'Shanter Escaping from the Witches, in cork —*J. Whitehouse.*

21. A Battle, from one of Le Brun's pictures, price £210 —*M. L. Bryant*, 30, St. James's-street, S.W.
22. A Clock Case, in walnut wood, unfinished, the architectural lines to be picked out with black, the ornamental lines with gold—designed and carved by *Mark Rogers.* Price £15.
23. A Panel, in walnut wood, of Dead Game, in a wreath of oak, blackberry, fern, &c., intended for the decoration of dining-room, sideboard, or chimney-piece—modelled and carved by *Mark Rogers*, No. 111, Tachbrook-street, Pimlico, S.W. Price 20 guineas.
24. Hand Glass—Exhibited by *J. H. Wyatt.*
25. Festoon of Flowers—Carved by — *Mouatt* (deceased), —Exhibited by *J. H. Wyatt.*
26. The Poacher—*C. J. Herley.*
27. Walnut Clock Case, unfinished—*J. Booth*, 6, Crown-terrace, Prince of Wales's-road, Haverstock-hill, N.W.
28. Dead Swallow—By *De Montrieul*, exhibited by *E. Greaves, Esq., M.P.*
29. Apollo (boxwood)—By *Shee*, exhibited by *E. Greaves, Esq., M.P.*
30. Piece of Italian Work—Exhibited by *E. Greaves, Esq. M.P.*
31. Stag Hunt, executed by *T. H. Kendall* and — *Green*, under the direction of *J. M. Wilcox* (deceased), exhibited by *E. Greaves, Esq., M.P.*
32. Bracket, in style of Grinling Gibbons, price £12—By *T. H. Kendall*, Warwick.
33. Birds and Flowers, after the style of Grinling Gibbons—Modelled by *T. H. Kendall.* The birds executed by *T. H. Kendall* and *C. Humphriss ;* the frame by *W. Dunn.*
34. Bracket. Price £9—Executed by — *Simmonds* and — *Dunn*, under the direction of *T. H. Kendall.*
35. Flower Stand—The figures executed by *T. M. Kendall*, the other part by — *Dunn*, under the direction of the late *J. M. Wilcox*—Exhibited by *E. Greaves, Esq., M.P.*
36. Life and Death—Modelled by *T. H. Kendall*—Executed by *T. H. Kendall*, — *Green*, and *Charles Humphriss.*
37. Eagle, executed by — *Green*, — *Dunn*, and — *Jeffs* (deceased), under the direction of the late *J. M. Wilcox*—Exhibited by *E. Greaves, Esq., M.P.*
38. Pair of Brackets, price £4 10s. each, executed by *George Humphriss*— *T. H. Kendall.*
39. Jay and Bullfinch, by the late *J. M. Wilcox*—Exhibited by *E. Greaves, Esq., M.P.*
40. Pier Table—*T. H. Kendall.*
41. Dead Snipe—*E. Dujardin*, 7, Richmond-terrace, East-street, Walworth.
42. Dead Woodcock, designed, modelled, and executed, by *T. W. Wallis*, Louth.
43. Group of Fish, executed by the late *W. Bevan*—Exhibited by *Chas. Asprey*, 166, Bond-street, W.
44. Willow Wren (property of Miss Burdett Coutts)—*W. Perry.*
45. Robin in the Oak (box-wood)—*W. Perry.*
46. Thrush (lime-tree)—*W. Perry.*
47. Nightingale and Hawthorn—*W. Perry*, 5, North Audley-street, Grosvenor-square, W.
48. Sedge Warblers and Dragon-fly (property of *W. M. Coulthurst, Esq.*)—*W. Perry.*
49. Monthly Rose, executed by the late *W. Bevan*—Exhibited by *Chas. Asprey.*
50. Carved Glass Frame for gilding, in the style of Louis XVI. Plate 120 by 80. Suitable for decoration end of drawing-room. To be mounted on marble plinth. (For sale)—By *S. Lecand*, 246, Tottenham-court-road.

The Two Seasons (boy-stands). Carved and richly gilt. To hold lights or vases. (For sale, price 30 guineas each)—*S. Lecand.*

51. Two Carved Brackets, with gilt tops. Price 50s.—By *S. Lecand.*
52. Door Panel. Price £5 5s.—By *C. J. Herly.*
53. Enamelled Bracket—By *W. M. Holmes*, 101, Dean-street, Oxford-street.
54. Robinson Crusoe—By *R. L. Thompson*, 2, Alderney-road, Bancroft-road, Mile-End.
54A. Christian Warrior—By *R. L. Thompson.*
55. Head of Infant Bacchus. Price £1 15s.—By *W. M. Holmes.*
56. Limetree Panel. Price £4 4s.—2 Bread Platters, Photographs in Frames—By *John Lamb*, 83, Clayton-street, West, Newcastle-on-Tyne.
57. Carving in the Grinling Gibbons style—By *John Askew.*
58. Ebonized Bracket. Price £3—*W. M. Holmes.*
59. Inkstand and other articles—Exhibited by *Charles Asprey.*
60. Portions of Sideboard—Exhibited by *Messrs. Gillow and Co.;* Boys for Trusses—Carved by *G. Romford.* The Fish and Shell Panels—By *R. Flipping.* The Pheasant and Woodcock—By *J. Wills*; and the Partridge and Snipe—By *J. Mackie.*
61. Italian Frame (box wood), date 1530—Exhibited by *Thomas M. Whithead.*
62. Candelabrum—*J. H. Wyatt.*
63. Alegorical Vase in box wood, illustrative of the International Exhibition—*W. Perry.*
64. Communion Plate—Exhibited by *Charles Asprey.*
65. Owl—Executed by — *Green* and — *Preston*, under the direction of the late *J. M. Wilcox*—Exhibited by *T. Heath, Esq.*
66. Book Tray—Executed by — *Green* and — *Dunn*, under the direction of the late *J. M. Wilcox*—Exhibited by *T. Heath, Esq.*
67. Oak Instand—Designed by *T. H. Kendall*, executed by *T. H. Kendall*, — *Green*, and *Charles Humphriss*—Exhibited by *D. Evans, Esq.*
68. Wreath—Exhibited by Society of Wood Carvers.
69. Photograph—Exhibited by Society of Wood Carvers.
70. Portrait of Grinling Gibbins—Exhibited by Society of Wood Carvers.
71. Photograph of a German Carving—Exhibited by Society of Wood Carvers.
72. Walnut wood Fire-screen—*W. M. Holmes.*
73. Blotting Book—*W. M. Holmes.*
74. Casket in box wood—*T. H. Baylis*, 69, Judd-street, Brunswick-square, W.C.
75. Frame—*T. H. Baylis.*
76. Paper Knife, Stilletto, and Christmas Box—By *T. H. Kendall.*

ANNUAL GENERAL MEETING.

WEDNESDAY, JUNE 24, 1863.

The Annual General Meeting for receiving the Report from the Council, and the Treasurers' statement of the Receipts, Payments, and Expenditure during the past year, and also for the Election of Officers, was held at the Society's House on Wednesday, the 24th inst., at 4 p.m. Sir THOMAS PHILLIPS, Chairman of the Council, presided.

The SECRETARY having read the notice convening the meeting, the minutes of the last Annual Meeting, and subsequent Special General Meetings, were read and signed.

The CHAIRMAN said the meeting was now duly constituted for the purposes stated in the advertisement just read. Before declaring the ballot opened, he would mention that there had been a slight omission on the part of the Secretary, which was not however of substantial importance. The Bye-laws of the Society required that the list prepared by the Council should be suspended in the Society's room for seven days prior to the meeting, whereas it had only been suspended since last Friday. The list, however, was in the Secretary's office, for the inspection of any member who desired to see it, and had been sent round to every member, as directed by the Bye-laws. He believed that only one member called at the office for the purpose of inspecting the list, when it was shown to him. There had, therefore, been no departure from the spirit of the Bye-laws.

The CHAIRMAN then nominated Mr. Joseph Payne and Mr. Robert Hunt, F.R.S., as scrutineers, and declared the ballot open.

The SECRETARY read the

ANNUAL REPORT.

In compliance with the terms of the Charter and Bye-laws, the Council now present to the Annual General Meeting of the Society the following Report:—

INTERNATIONAL EXHIBITION.

In their last report, the Council had the satisfaction of reporting to the members the opening of the International Exhibition of 1862, an undertaking for the establishment and success of which the Society had long and earnestly laboured. It is now the duty of the Council to report its close, which took place on the 1st of November. The Exhibition premises were subsequently kept open for a fortnight, to enable exhibitors to dispose of their goods, and the public were admitted during that period. The Commissioners' Report on the Exhibition and the statement of their accounts have not yet been published, but the Council have been informed by the Commissioners that the accounts have been submitted to the Governor of the Bank of England and the Comptroller General of the National Debt, two of the auditors appointed by the Charter, by whom the same have been duly audited. The Commissioners have also informed the Council that the sum which was advanced by the Bank of England has been repaid with interest, and that the liability of the guarantors has ceased. The Council have had much satisfaction in making known this result to each of the guarantors who so disinterestedly came forward to assist in the pecuniary responsibility of the great undertaking, which the Society devoted its energies to promote. To these gentlemen the thanks of the industrial world are eminently due, for without their substantial support the Exhibition could not have taken place. The Council must at the same time record their sense of the zeal and labour with which Her Majesty's Commissioners discharged the task they undertook, at the request of the Society and of the guarantors. Under a combination of adverse circumstances, any one of which, could it have been at the outset anticipated,

would at once have stopped the undertaking, the Commissioners presented to the world an Exhibition of Art and Industry such as had never before been seen. Under the Charter incorporating the Commissioners, the Society would have been entitled, upon certain contingencies, to a portion of the Exhibition building, and also to a lease of the site to be granted by the Commissioners of the Exhibition of 1851. As, however, no gain attended the undertaking, the Society could make no claim to the building.

Jury Reports.

The Council undertook the publication of these Reports, as authentic records of the progress of industry since the Exhibition of 1851, and it was their anxious desire, and they had every reason to believe that they would have been enabled to publish them while the Exhibition was open. The reporters of the several Juries promised their co-operation, and it was expected that they would have completed their work in time. In the month of September it was found, however, that it would be impossible to issue the work complete at the period proposed, and the Council determined to issue, without delay, all the reports which had been received up to that time, and accordingly that was done, leaving the remaining reports to be issued when completed. The Council regret exceedingly the delay which has occurred, but when it is considered how numerous were the reporters, how varied their occupations, and how in some cases the work was found more than the reporter, from unexpected circumstances could accomplish, and others had to be found to undertake the task; and moreover, when it is considered that the work undertaken by the reporters was voluntary and unpaid for, the Council were not in a condition to avoid the delay which has arisen. The reports, with inconsiderable exception, are now in type, and will, as soon as the index is completed, be issued to the subscribers.

Artistic Copyright.

At the time when the last report was laid before the members, the Artistic Copyright Bill, promoted by the Society, was receiving the consideration of the legislature. The Council have now to record that it has passed, and that the Society's efforts to obtain a recognition of Copyright in Works of the Fine Arts have been crowned with success, and paintings, drawings, and photographs, in which no copyright had existed, have had their claims to copyright recognised by the passing of "An Act for amending the law relating to Copyright in Works of Fine Arts, and for repressing the commission of fraud in the production and sale of such works," which Act received the Royal Assent on the 29th July, 1862.

Committees.

In order to enlist in the operations of the Society the energy, skill, and information of such of its members (now so numerous) as may feel disposed to take an active part in promoting the objects for which the Society is founded, the Council thought it right in carrying out the 36th Bye-law in reference to the formation of panels from which Committees of Reference are selected, to take a more extended action than had hitherto been the case. They therefore divided the objects of the Society into such heads as they thought would be most convenient, and classified the objects for the promotion of which the Society is incorporated as follows:—

1. Fine Arts (including Painting, Drawing, Sculpture, Architecture, Engraving, Music, Photography and Design applied to Manufactures).
2. Agriculture (including Agricultural Implements and Machines).
3. Chemistry applied to the Arts (including Mining, Metallurgy, Chemical Manufactures, Dyeing, and Calico Printing).
4. Manufactures—*a.* Textile. *b.* Metallic, and working in Precious Metals. *c.* Glass and Pottery. *d.* Leather. *e.* Furniture and Decoration.
5. Mechanics (including Engineering and Machinery, Railway and other Carriages, Architectural Construction, Models, &c. Shipbuilding and Naval Matters).
6. Commerce.
7. Colonies.
8. Education and Educational Appliances.
9. Economic and Sanitary Science.

Having agreed on this classification, a circular was issued to each member, asking under which class he would desire to be placed, and when the returns were completed the members were formed into Committees under the several sections into which the objects of the Society had been divided. These Committees have been separately called together for deliberation, and each has held one or more meetings. It is anticipated that when the system thus commenced has had time to develop itself important results may be obtained, and the efficiency and influence of the Society enlarged. The system, however, is necessarily dependent on the exertions of individual members, and the Council earnestly hope that members, so far as in them lies (each in his specialty), will give the benefit of his knowledge to the promotion of the varied and important objects, whether in Arts, Manufactures, or Commerce, which the Society embraces, and the Council rely on the members thus to increase the efficiency and extend the utility of the Society.

In addition to these Committees, a Committee has been appointed to obtain information on Submarine Telegraphy, supplementary to that con-

tained in the Board of Trade Report issued in 1861. This Committee has held frequent meetings, and is still prosecuting its labours, which, from the nature of the inquiry, must necessarily extend over a considerable period of time.

Premium List.

One of the first duties which the Committees were requested to undertake was to make suggestions to aid in the preparation of the Premium List about to be issued, and considerable assistance in its formation has already been afforded. The list is in type and will shortly be completed and issued.

The Council are indebted to J. Bailey Denton, Esq., for a Prize of £35, to which the Society has added its Silver Medal, for plans for labourers' cottages which can be erected at a cost not exceeding £100 each.

Sir Walter Trevelyan, Bart., has placed in the hands of the Council a sum of £70 to be offered in Premiums for any subjects the Council may think fit.

Prizes to Art Workmen.

Early in the year a communication was received from the Society of Wood Carvers, asking the aid of this Society in promoting the Art of Wood Carving in this country, and the Council agreed to allow the use of the Society's rooms for the purpose of holding an Exhibition of Wood Carving. The Council also agreed to offer the Society's Silver Medal and to make a grant of £30, the Society of Wood Carvers giving £15, to form a fund for Prizes to be awarded to exhibitors on that occasion. The particulars of the competition have already been published in the *Journal*, and the Exhibition is now open.

Employers or private owners may be Exhibitors, but *bona fide* workmen only can receive prizes.

The following are the awards of the judges, of whom four have been appointed by the Society of Arts, and three by the Society of Wood Carvers:—

First Division. Human Figure in Alto or Bas Relief.

Animals or natural foliage may be used as accessories.

1st Prize of £8 and the Society's Silver Medal, not awarded.

2nd Prize of £4, to James Meiklejohn, 29, William-street, Regent's-park, N.W., for "Apollo playing to the Shepherds," alto relief, in oak.

3rd Prize of £3, to G. Rumford, 9, Ecclestone-street, S.W., for "The Rose-bud," child's head in limetree.

Second Divison. Animal or Still Life.

Fruit, flowers, or natural foliage, may be used as accessories.

1st Prize £8, to Mark Rogers, No. 111, Tachbrook-street, Pimlico, for a Panel, in walnut wood, of Dead Game, in a wreath of oak, blackberry, fern, &c., intended for the decoration of dining-room, sideboard, or chimney-piece—modelled and carved by him.

2nd Prize of £4, to be divided between — Green and Charles Humphriss, with honourable mention to T. H. Kendall, their employer, for "Life and Death," modelled by T. H. Kendall—Executed by T. H. Kendall, — Green, and Charles Humphriss.

3rd Prize of £3, to W. Perry, 5, North Audley-street, Grosvenor-square, W., for the "Willow Wren" (property of Miss Burdett Coutts), "Robin in the Oak" (box wood), "Thrush" (lime-tree), "Nightingale and Hawthorn," "Sedge Warblers and Dragon-fly" (property of W. M. Coulthurst, Esq.)

Third Division.

Natural foliage, fruit, or flowers, or conventional ornament in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.

1st Prize of £8, to T. H. Baylis, 69, Judd-street, Brunswick-square, for his "Casket in box-wood."

2nd Prize of £4, to T. H. Kendall, of Warwick, for "Paper Knife, Stiletto, and Christmas Box."

3rd Prize of £3, to R. Flipping, for "The Fish and Shell Panels," Portions of Sideboard, exhibited by Messrs. Gillow and Co.

Two extra Prizes are awarded by the Society, of £2 each, to J. M. Leach, of Louth, Lincolnshire, for a Panel for the Pilaster of a Cabinet, designed and executed by him; and to C. J. Herly, of 2, Camden-place, South-street, Taunton, for a Door Panel, designed and executed by him.

Subsequently, the Council determined to extend the principle of rewarding art-workmen in wood-carving to other branches of skilled labour, and they have offered premiums to workmen in the several branches of

1. Modelling in Terra Cotta, Plaster, and Wax.
2. Repoussée work in any metal.
3. Hammered work, in Iron, Brass, or Copper.
4. Carving in Ivory.
5. Chasing in Metal.
6. Enamel Painting on Metal, Copper, or Gold.
7. Painting on Porcelain.
8. Inlays in Wood (Marquetry or Buhl), Ivory or Metal.
9. Engraving on Glass.
10. Embroidery.

The time for sending in these works does not expire till the 31st of August, but candidates intending to compete must send in notice of their intention not later than the 15th of July.

The Society's Memorial to the Prince Consort.

In February last at a Special General Meeting of the members, it was resolved that a subscription should be entered into among the members for a bust of their late President, to be placed in the Society's House, the amount of each subscription not to exceed one guinea. That subscription now amounts to £670, which being more than is required for a bust, the Council will convene a general meeting of the members, to consider in what manner any overplus beyond that required for the bust should be expended in honour of their late President.

The Council have taken steps for obtaining designs for the Albert Medal, which the Society has determined to present hereafter as a further Memorial of their late President, "for distinguished merit in Arts, Manufactures, and Commerce." A commission has been given to Mr. Leonard Wyon, for a model of the Prince Consort's head, for the Obverse, and commissions have been given to other artists for designs from which the Reverse may be selected, such designs to be illustrative of Arts, Manufactures, and Commerce.

Premises.

The Society's lease has been renewed for a term of 30 years, to commence from Lady-day, 1867. The premium of £2,250 has been paid, as will be seen by the accounts published in the *Journal*. The Council have had under consideration plans for giving more accommodation to the members in the Society's meeting room, and for improving the ventilation of the room and the drainage of the house, as well as for adding to the library and providing accommodation for members desirous of availing themselves of the works contained therein, and it is intended forthwith to carry out these plans, so as to have the house ready at the opening of the next session.

Conversazioni.

Although one conversazione only has been held this season at the South Kensington Museum, yet three have taken place during the year, it having been thought desirable that the Society should extend its hospitality to the very many foreigners and strangers in London during the Exhibition. These two Conversazioni, in connection with the Exhibition, took place at South Kensington, in July and October last, and were very numerously attended.

Union of Institutions.

For the particulars of the proceedings of the Society in this branch of its operations, the Council refer to the report of the Secretary, read to the Conference on the 12th instant, by which it appears that the number of persons examined this year has been larger than on any former occasion.

Cantor Bequest.

Under the terms of this bequest, amounting to £5,042 invested in the purchase of India Securities, it has been the duty of the Council to make some special appropriation of the fund towards the promotion of Arts, Manufactures, and Commerce, and it has been determined to apply a portion of the interest of the fund for the coming session in providing three courses of lectures, by eminent men, on the following subjects:—

International Commerce.
Chemistry applied to Manufactures.
Industrial Art.

The Council estimate the cost of these lectures at £150, and intend to employ £50 in the purchase of books suitable for the library, to be marked "Purchased from the Cantor Bequest."

Finance.

For the particulars of the Society's expenditure and financial position, the Council refer to the statement printed in the *Journal* last Friday.

In accordance with the Bye-laws, the Treasurers have prepared the Annual Statement of Receipts, Payments, and Expenditure, and also of Assets and Liabilities, and in submitting the same to the members, desire to state that they have thought it better to modify the form of the account. In former years the statement submitted was an account proper to the year, and consisted of items many of which were founded on estimate only, but did not represent money actually received and paid during the year. The account which is now in the hands of members is an absolute cash statement of the receipts and payments during the year. A comparison of the present with former years will show that the Society's income, from the annual subscriptions of members, continues steadily to increase, and the receipts from that source for the present year are £300 in excess of those of last year. In directing the attention of members to the expenditure side of the account, it will be seen that the Society has been enabled to discharge the entire sum of £2,361 6s. 11d. (the fine and costs due to the renewal of the Society's lease,) without employing any portion of the Society's funded property. There has however been temporarily borrowed from funds in the hands of the Treasurers a sum of rather less than £500; which the Council are in a position to replace whenever it may be required. The discharge of so large a sum out of the annual receipts has reduced the balance on the year in favour of the Society to £339 18s. 10d., but as this is owing to an investment made for the permanent advantage of the Society, it will at once be seen that the Society's finances are in a very satisfactory position.

The Council congratulate the Society on the

increased number of members, and the increased power of the Society for promoting the objects for which it is incorporated.

Mr. Dawbarn moved the adoption of the report, which was seconded by the Rev. R. Whittington.

Mr. J. H. Murchison said before that resolution was put, he begged to state that he was present in accordance with the expressed wish of the Council attached to the notice which appeared in the *Journal* last week. The paragraph he alluded to stated that the Council ventured to hope that the members would evince their interest in the Society's proceedings by attending this meeting. He cordially agreed with that view. He was convinced that it would be greatly to the advantage of the Society if the members generally were to take a more active part in its proceedings, and if they were to attend the general meetings and give utterance to the opinions they entertained with regard to the course of proceedings adopted by the Council. With regard to the accounts, he was glad to find that the officers had taken advice from those who ventured to give it at the last general meeting, and had modified the statement so as to make it at all events a little more intelligible; because he was quite sure that those who had paid attention to the accounts of the Society for some years past must have been quite at a loss to understand what they really meant, and in fact he thought there were great doubts whether the auditors themselves understood them. At the last meeting he ventured to criticise the accounts, along with other members of the Society, and on that occasion a gentleman got up and stated that the accounts were exactly in the same form in which they were published about thirteen years ago, when he (Mr. Murchison) affixed his signature to them as one of the auditors. He had not beside him on that occasion the accounts then alluded to, but he had since obtained a copy of them, and he thought two accounts more dissimilar in character, more different in principle, and certainly more different in the clearness with which they were drawn out, could scarcely be met with. He had since ascertained that the gentleman who made that remark was no other than one of the auditors who had signed the accounts on this occasion. He therefore thought that was some justification for saying that he doubted whether the auditors understood the accounts that had been presented for the last few years. Previous to the year 1858, he found that the subscriptions of members and of the institutions in union were entered—first, the amount actually received; to that was added the amount of outstanding subscriptions, deducting from that the subscriptions due in former years, with an estimate of the amounts not recoverable, and then the total was carried out. In 1858 the Council appeared to have opened their eyes to the incorrect manner in which the accounts were laid before the Society, and they altered in that year the mode of bringing the accounts before the members, and carried out only the amount received, leaving out in the receipts the amount in arrears outstanding; and they added to their report this remark:—"The Council consider this gives a more just view of the finances of the Society." What might have been the reason why the Council altered their views as to the most just mode in which the accounts should be made out, he could not tell, for they had since gone back to the old plan. On the present occasion they had a statement of accounts which was called the Annual Statement of Receipts, Payments, and Expenditure; and they were told in the explanation now given them, that the receipts consisted only of the amounts actually received, and he looked in vain through the statement of assets for any amount whatever as representing arrears of subscriptions. Surely that ought to be entered as an asset; but in the statement now presented there was no sum whatever given for the arrears of subscriptions.

The Chairman said there was a note to that effect at the end of the accounts.

Mr. Murchison said the fact was apparent upon the face of the accounts without the note. He thought the accounts would be more perfect and intelligible if under the assets the amount of arrears of subscriptions was stated.

The Chairman said the subject was considered, and it was felt that as the receipt of those arrears was a matter of uncertainty, it would be inconvenient to include them as specific assets, and the members would be informed of the real state of things by the note at the foot of the accounts, stating that the assets did not include the subscriptions over due.

Mr. Murchison remarked that it did not require the note to show that they were not included, because it was clear upon the face of the accounts that they were not included, and he complained that there was no statement of what the amount was, with, of course, the same entry as used to be made as to the estimated amount not recoverable. Leaving the question of the accounts for the present, he would come to the point referred to by the Chairman in opening the business of the meeting. Under the 100th bye-law, it was required that the list of the council and officers prepared for the ensuing year should be suspended seven days previous to the general meeting, and that such list should be the balloting list at such meeting. He (Mr. Murchison) was no doubt the member referred to by the Chairman as having called and requested to see the list, and it occurred on the Friday afternoon, as he was going out of town, and would not have had an opportunity of getting a copy of the list for some days. Not obtaining a printed list in the lower offices, he went into the secretary's room, thinking he should be able to get a copy from that gentleman. Upon stating the purpose of his visit, he was told by Mr. Foster that there was no list, upon which he (Mr. Murchison) remarked that he could look at the list hanging in the room. Mr. Foster replied that there was no list hanging up. He then called Mr. Foster's attention to the fact that, according to the bye-law, it was required that the balloting list should be suspended seven days prior to the general meeting; thereupon Mr. Foster expressed his opinion that, according to the bye-laws, no such step was necessary, to which he (Mr. Murchison) replied that, according to the copy of the bye-laws in his possession, it was necessary. Mr. Foster then procured a copy of the bye-laws, and, upon reference to it, the fact appeared as he (Mr. Murchison) had stated it. Mr. Foster then stated that he had not been aware of any such requirement, and that he did not think it had been done before. Now, if that were the irregular way in which their business was conducted, he thought there might be other irregularities which they might have occasion to find fault with. There was another mistake of the Chairman's he would advert to. When he first asked the question he was told there was no copy of the list. As it turned out there was no perfect and correct copy, inasmuch as the list handed to him contained four or five names intended to have been proposed, and there were a number of other names which did not appear in the present list. No correct list was then shown him, but one was sent to him by post on the Saturday.* Now, the bye-laws were binding or they were not. If they were binding, the Council were bound to

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* The Secretary admitted to Mr. Murchison that he had made an error in not suspending the list which had been prepared by the Council, as required by the Bye-laws. He informed Mr. Murchison that he could not give him a copy of the balloting list as the copies had not been sent in from the printer's. A copy had been sent to every member of the Society that morning with the *Journal*. He showed Mr. Murchison a rough but correct list as settled by the Council, and, at Mr. Murchison's request, gave to the printer an order to send a copy to Mr. Murchison by that night's post.—*Editor*.

have the balloting list suspended in the Society's room seven days previous to the meeting, and if this proceeding were to be taken as a precedent, he must be allowed to say that, on a future occasion, the Council could scarcely be prepared to enforce the latter part of the same bye-law, which stated that the list so suspended "shall be the balloting list at such annual general meeting." According to the bye-law, no member could use a paper other than those issued by the Council, but if the spirit merely and not the letter of the bye-law were carried out, it would be no infringement of the bye-law if members had lists printed for themselves, and used them as the balloting lists at the meeting. Before carrying his remarks any further, he begged to disclaim all personal feeling in the observations he purposed addressing to the meeting on this occasion, but the proceedings of this Society had forced themselves so much upon public attention, that at an annual meeting of the members it was impossible to avoid taking some notice of them. He found that, by another bye-law, it was necessary that, upon each occasion of the election of the Council, eight at least of the members should go out of office, viz., four vice-presidents and four ordinary members of Council. Mr. Murchison having read the bye-law on that subject, went on to remark that that bye-law provided for the appointment annually of eight members of the Council, who should not have served upon the Council during the current year of office. Now he thought it must have struck every member of the Society that, although during the last fifteen years there must have been numerous changes and new names placed upon the Council, yet there were certain names which had never been changed; and whatever might have been the cause, now that popular indignation had been aroused, it somehow or other fastened upon those names, and the Society of Arts had been brought into a very unpleasant position. The name of the Society of Arts, through much of its proceedings, had become the derision of the public; and he thought he was sufficiently justified in making that remark by a few short extracts which he would read from some of the most influential of the public press of the country. Mr. Murchison then read several extracts from newspapers, which, he thought, tended to prove that it was high time for the members of the Society generally to take a more active part in its affairs, because it was notorious that men of high standing in the world of art and science held themselves aloof from this Society, because they were disgusted at the way in which the proceedings of the Society had been carried on for some years past. Now he found that during the last six years, looking at the way in which the finances had been expended, a most miserable sum of money figured as the amount that had been devoted, during that period, to the real objects for which the Society was incorporated. He found that during the last six years the amount expended in the management of the Society had been about £12,000; that the amount (which appeared to be almost a stereotyped one) for repairs and alterations of the premises was £457 for the same period; that the expenses of conversazioni during the same period was £1,320; but the expenditure for awards and medals for the objects for which the Society was instituted amounted to only £84 13s. 6d. Now, looking to these facts, he thought it would be of very great advantage if the members of this Society would act upon the suggestion of the Council, and show their interest in the proceedings of the Society by taking a more active part in its affairs for the future. There was one other point he wished to refer to, and he had done so more than once in this room. It was this. It was well-known that the name of the Society of Arts had been largely connected with the promotion of the two Exhibitions which took place in 1851 and 1862; but it appeared to him that there were "wheels within wheels" in these matters. He thought the Council of this Society might have done much to avoid the strong feeling of dissatisfaction that had arisen during the last two years with regard to the Exhibition building, if, during the interval between the two great International Exhibitions, they had turned their attention to the obtaining of designs for the building of a more appropriate, a more decorative, a more ornamental, pleasing, and more satisfactory character. He thought the Council had failed in their duty in not devoting a portion of the funds of the Society to that which certainly came most legitimately within its objects—the procuring in good time designs for the building of the late International Exhibition. He hoped, if ever they had another exhibition, they would not have a building erected under the designs of Captain Fowke. In order to bring himself regularly before the meeting, he begged to move—

"That the form in which the annual accounts are presented is unintelligible and imperfect, and that the system adopted in selecting the names of the Council is exclusive and is detrimental to the popularity and interests of the Society."

Mr. Philip Wright said, in seconding the amendment just proposed, he would not dwell upon the latter clause of it. He quite agreed that the accounts were imperfect and unsatisfactory. From what had been stated in the report some modification of his remarks was necessary, but in substance they would remain the same. They had now to deal with the statement of receipts, payments, and expenditure. Anybody looking at the present balance sheet would imagine that the Society was £339 18s. 10d. better off this year than last, whereas in point of fact it was at least £1,000 deficient. Looking to the statement of liabilities and assets, he found the item of Jury Reports £839 8s. 6d. That was the balance of receipts over payments on that account. Then followed "Society's Memorial to the Prince Consort, £609 0s. 6d.;" also "Balance of South Australian Institute," and "Maitland School of Arts." These, he apprehended, were special funds for specific objects, and had nothing to do with the general assets of the Society. In the statement, then, for the year, these sums, viz.:—

Jury Reports	839	8	6
Memorial	609	0	6
Balance on account of South Australian Inst.	3	11	10
Do. Maitland School of Arts	11	8	8
Together with due to the Financial Officer .	2	0	8
Making a total of. . . .	£1465	10	2

were carried in excess to receipts over payments. Against that they had "Working Classes Museum (which he fancied was a special fund) £2 12s. 3d." Therefore, they had on the receipt side £1,462 17s. 11d. too much, and taking the balance brought down of £339 18s. 10d., he found they had a deficiency of £1,022 19s. 1d. He was somewhat surprised at the statement which preceded these accounts, which was to the effect that the accounts were published in accordance with section 42 of the Society's Bye-laws, inasmuch as when he turned to those Bye-laws he found it was required that the accounts should contain a statement of all the funds of the Society, with all amounts due. In the statement before them he did not find any item of the value of the lease, and the members had no means of knowing what their property was in any way or shape. It certainly was not an account giving a statement of the funds of the Society. He agreed with Mr. Murchison that the arrears of subscriptions ought to appear in the accounts, not as an absolute asset but as a possible asset. He considered the excess over liabilities had been put down at least £2,000 more than it really ought to be. They had put down Consols at £6,530 18s., whereas £1,333 6s. 8d. was a special fund for the Swiney prize, and £100 Stock trust, which he apprehended was also some special fund. That took off £1,433 6s. 8d., leaving, as was correctly stated in the accounts last year, the amount of Consols at £5,097 11s. 4d. Then again, New 3 per Cents. were stated at £388 1s. 4d., but they had not put on the other side the Fothergill trust, though what that was he did not know. Then again, Consols had been put down as ab-

solutely worth £100 per cent., which they were not. The Indian 5 per cent. promissory notes were a little in excess. He thought any auditor would say they should value their funded property at the current rate. He had not ascertained what that rate was on the 30th May, but he would take for example some of the valuations in property made last year, viz., Consols, 93½, and Indian rupees, 103; that would bring the value of their funded property to £10,122 3s. 3d. Then there was cash in bankers' hands, £1,035, which made a total of £11,157, against which they had the liabilities of the special fund he had referred to, amounting to £1,927, leaving the actual balance of funded property £9,229, instead of £11,226, which was, within a few pounds, a deficiency of £2,000. In other words, they were £2,000 worse off, excepting that which he submitted ought to be taken into account, viz., the value of the lease of the Society.

The Chairman said the latter item might be calculated by the sum which was stated to have been paid for the lease.

Mr. Wright said it was undoubtedly an asset, and ought to have been included as such; in this respect the accounts were not correct. He found that the entire expenditure of the Society was included under the three heads of general establishment expenses, general expenditure, and special expenditure, although he was at a loss to know upon what principle the financial officer acted in placing the items under the several heads. For his own part, he should have imagined that repairs and alterations would properly have been included in the general establishment charges. Mr. Wright proceeded to notice the several items included under the head of special expenditure, contrasting them with those which appeared in the previous year's accounts. He considered the auditors would do well to exclude from the general expenditure all accounts which were provided for by special funds, inasmuch as under the present form they could not tell, without going much deeper into the matter than members were ordinarily inclined to do, what was the real state of the case. The report from the Council stated that there was only £500 borrowed from a special fund.

The Chairman said if they took £1000 on one side, from £1500 on the other side, that clearly left a balance of £500.

Mr. Wright submitted that it was not a question of the assets of the Society here, but whether the amount borrowed from these special funds was £500, as stated in the report, or £1,400 as he asserted it to be.

The Secretary said the explanation as to the £500 was this—The Society had in hand the moneys for the Jury Reports £839 8s. 6d., and the subscriptions of members towards the Prince Consort Memorial amounted to £641 15s., making in round numbers £1,400, and, in order to pay their way, the Society had borrowed £500 from those funds to do it with.

Mr. Wright contended that he had shown that they had borrowed £1,400.

The Secretary explained that £500 had been borrowed in the way stated, and they had £900 of those funds in the hands of the bankers, and the £500 added to that would make the total of those special funds. He read the clause of the report referring to this subject.

Mr. Wright contended that the present form of accounts did not correctly show the financial statement for the year. It set forth that the Society was £339 better this year, whereas, he submitted, they were worse by £1,022. He repeated his opinion that the arrears of subscriptions ought to be set out. Explanations having been given by the Secretary of various minor items, Mr. Wright concluded by seconding the amendment proposed by Murchison.

Mr. W. Hawes said they must all feel obliged to the gentleman who spoke last for the information he had elicited, and for the very proper manner in which he had brought his views before the meeting. There could be no wish on the part of the Council but that the accounts should be placed before the members in a form which would show in the clearest possible manner the total amount of the property belonging to them. If there was any fault in the mode in which the account was made out it could be remedied, and the Council would no doubt be glad at a future time to benefit by the services of the last speaker if they failed again in satisfying him as to the mode in which the accounts were presented. It was, however, to be recollected that the present form of accounts had been adopted very much in consequence of the fault which was found last year, because on that occasion the accounts included a statement of the subscriptions in arrear but not received. This year, in consequence of the criticisms passed on that account, that item had not been brought forward as an asset of the Society. He could hardly reconcile the two complaints as consistent—that the Council should be blamed for not having set out the amount of arrears of subscriptions they had not received, while on the other hand complaint was now made that they had set forth as an asset, funded property they actually possessed and to which an explanation was attached, that the income arising from it was chargeable with the sum of £200 every five years for the special purposes to which that fund was appropriated. He still thought that the accounts were made out in a proper form; but as a member of the Council he would say it was the desire of the Council that the most critical examination of the accounts should be made, and they were desirous to take advantage of any suggestion whereby any improvement in the form of presenting the accounts could be effected. He must, however, be allowed to say that the spirit in which the observations of the first speaker were made was of a very different character to that which characterised the remarks of the gentleman who followed him. Some criticism had been offered upon the conduct of the Secretary, with regard to not suspending the list of names proposed as the Council for the ensuing year. He (Mr. Hawes) happened to be present at the time, and heard what passed between that gentleman and Mr. Foster.

Mr. Murchison said he had been with Mr. Foster a considerable time when Mr. Hawes came into the room.

Mr. Hawes said he heard the observations that passed relative to the suspension of the list, and the circumstances were these:—Mr. Murchison complained that the list was not suspended, and asserted that the election would be illegal in consequence. Mr. Foster immediately admitted that it was an omission on his part, caused by his numerous engagements at that period; that he had forgotten it was necessary, but that the omission was of no importance, and would not affect the legality of the election; but Mr. Foster immediately ordered a copy to be sent to Mr. Murchison by post in accordance with his request, so that it was quite clear there was no desire on the part of the Secretary to avoid giving Mr. Murchison the fullest knowledge of what had been done by the Council in respect of the names to be proposed.

Mr. Murchison said he had made no such charge against Mr. Foster.

Mr. Hawes added that a promise was given to Mr. Murchison that a correct list should be forwarded to him, and a list was forwarded to him, and, in accordance with the bye-laws, a copy had been sent with the last *Journal* to every member of the Society. The same gentleman had told the meeting that his observations were divested of anything like personal feeling. He congratulated Mr. Murchison on the statement that he brought these matters forward year by year without the slightest personal feeling. The matter introduced, and the manner employed, made it difficult to understand this. They had been entertained by his reading extracts from various newspapers, reflecting upon the Society as connected with the Exhibition building, with which, or the management of the Exhibition, the Society had nothing whatever to do; but he (Mr. Hawes) held in his

hand an extract from another paper, which beat all that had been read by Mr. Murchison in disparagement of the Society of Arts, and which he would read to the meeting, to show him the Council and the Society were not affected by comments of such a character. Having read the extract referred to, Mr. Hawes went on to say that the language of this extract surpassed in virulence every thing that Mr. Murchison had favoured them with. If the half dozen quotations read by that gentleman, added to his own remarks, were to be taken as a test of the estimation in which this Society was held, let them, at the same time, take notice of another test which was afforded by facts, and not by opinions of unknown writers. The Society had increased the number of its members more rapidly than any other Society, and during the last year, while their conduct was attacked in the way it had been by Mr. Murchison; the increase had been almost as large as during the last year of their late Royal President's active interest on its behalf. That was the proper test by which to judge of the estimation in which this Society was held, and he would safely refer them to the conduct of the Council, to show whether or not they had acted up to the spirit of their charter, viz., to employ their means, time, and energy in the encouragement of arts, manufactures, and commerce; and if one branch had met with more encouragement of late than another, it was that of giving prizes to working men for exhibitions of their works of art —not to the masters who employed them, but to the men who executed works like those which they now saw around them, and also to the promotion of their education and general improvement. These were the true tests by which to judge of the conduct of the Council and the usefulness of the Society, and on public opinion in reference to them they relied. He would not detain the meeting further than to repeat that, as a member of the Council, he felt obliged to the gentleman who had passed a fair criticism upon the accounts, but he must withhold the same measure of approbation from the remarks of the gentleman who preceded him.

Mr. W. B. Simpson said, as one of the unfortunate auditors who had excited the wrath of Mr. Murchison, he begged to say a very few words. He believed he did state at the last meeting that Mr. Murchison was an auditor with him when the form of accounts then submitted to the Society was carried out. He had thought no more of the matter since, and he believed he was not correct in that statement. About the year 1858, Messrs. Quilter and Ball, professional accountants, were employed to arrange a plan of drawing out the accounts; and last year they recollected how wrong it was said to be to bring forward prospective assets of which they might not realise one farthing, and how it was argued that they ought to put nothing into the accounts but actual monies received and paid. He could state that the gentleman associated with him as auditor was himself one of the first book-keepers in the kingdom, having a very large establishment under him; and in conjunction with the treasurer, they put their heads together to endeavour to carry out the views laid down at the last meeting. He could say that the audit had been of the strictest character, and every voucher was examined, even to the amount of 5s. and was verified before it was passed. He would stake his credit upon the thorough accuracy of the accounts; if any exception was taken to the form of them, he was sorry for it.

Mr. Murchison explained that it seemed strange that Mr. Hawes should persist in adhering to his version of what occurred at the interview with Mr. Foster, when he (Mr. Murchison) had reminded him that he (Mr. Hawes) was not present during the greater portion of the time. He reiterated what he had said in his speech as the correct account. [Mr. Hawes dissented.] He (Mr. Murchison) would appeal to Mr. Foster himself.

The Secretary stated that some conversation had taken place between Mr. Murchison and himself before Mr. Hawes had come into the room, and that during this time he had stated that he did not remember the bye-law requiring the suspension of the list.

Mr. Murchison said he would then leave the members to judge of the conduct of one of their Council.

Mr. Hawes replied that he had only stated, and he adhered to every word he had said, what had passed in his presence. He did not pretend to state what he did not hear.

The Chairman said he would make one or two observations before putting the question. He would not enter into any justification of the structure of the accounts. Accountants differed very much indeed as to the form of accounts; while one insisted upon a particular form, another would consider his own form the best, therefore he would not enter into that question; but he purposed telling the gentleman who had seconded the amendment that he (the Chairman) thought the cash account was prepared strictly in accordance with the Bye-law, which required that the Council should "render to the Society a full account of all their proceedings, and of the receipts, payments, and expenditure during the past year." The balance of a former year was neither a receipt nor an expenditure of the present year.

Mr. Murchison—What do you do with it? Give it away?

The Chairman said that, passing over the "smart" style of the interrogation, he would tell the meeting what was done with it. The seconder of the amendment had already detailed the disposition of it. They would find, as was stated, a balance of £339 18s. 10d. excess of receipts over payments in the year. It was stated that in former accounts it would appear that £625 3s. 6d. was the cash in hand; adding that amount to the £339 18s. 10d., they arrived at the sum of £965 2s. 4d., the sum stated in this account as being in the hands of the bankers at the close of the financial year. Again he said he would not go into the question of the best mode of making up the account; he only wished to show that as far as the cash was concerned, it was all accounted for. Nor would he enter upon the subjects which Mr. Murchison had thought proper to bring before them. He did not think the attention of the members was profitably engaged in criticising other bodies. This room ought not to be made—as of late had been too much the case—the scene of strong comments and indignant censure upon bodies who were not present, and were no part of this Society. Mistakes no doubt had been made, and would continue to be made to the end of the chapter; but with regard to other bodies, it was not fair to drag them into this room to be made before the Society of Arts objects of indignant comment. Some scribbler—he ventured to use that term—had penned the article from which Mr. Hawes had read an extract, in which he chose to connect the Society of Arts with the building for the late Exhibition, with which, however, they had no more to do than any other Society in the kingdom, never having been consulted with regard to the building, and having no right to offer an opinion upon it. It therefore seemed a little hard that this room should so frequently have been made the arena for the expression of strong comments upon a subject with which the Society had nothing whatever to do.

The Chairman then put the amendment, for which only the mover and seconder voted. He then put the original resolution for the adoption of the report, which was carried by the vote of a very numerous meeting of members, only two members being dissentients thereto.

The Ballot having remained open one hour, and the scrutineers having reported, the Chairman declared that the following members had been elected to fill the several offices. The names in *italics* are those of members who have not, during the past year, filled the offices to which they have been elected:—

COUNCIL.

PRESIDENT.

William Tooke, F.R.S.

VICE-PRESIDENTS.

Edward Akroyd.
Thomas Bazley, M.P.
W. H. Bodkin.
The Earl of Caithness.
Harry Chester.
Henry Cole, C.B.
Sir C. Wentworth Dilke, Bt.
John Dillon.
William Fairbairn, F.R.S.
The Earl Granville, K.G., F.R.S.
William Hawes.
Lord Henry Lennox, M.P.
M. H. Marsh, M.P.
Right Hon. Sir John S. Pakington, Bart., M.P.
Sir Joseph Paxton, M.P.
Sir Thomas Phillips, F.G.S.
The Marquis of Salisbury, K.G.
Thomas Twining.
Lord Westbury.
Vice-Chancellor Sir William Page Wood, V.P.R.S.

OTHER MEMBERS OF THE COUNCIL.

John Bell.
Hon. and Rev. Samuel Best.
Peter Graham.
Samuel Gregson, M.P.
Edward Hamilton.
Chandos Wren Hoskyns.
Frederick Lawrence.
Wm.. Odling, M.B., F.R.S.
Samuel Redgrave.
Sidney Smirke, R.A.
Thomas Sopwith, F.RS.
Thomas Winkworth.

TREASURERS.

W. B. Simpson. | George F. Wilson, F.R.S.

AUDITORS.

G. Shaw Lefevre. | G. Dixon Longstaff, M.D.

SECRETARY.

Peter Le Neve Foster, M.A.

FINANCIAL OFFICER.

Samuel Thomas Davenport.

A vote of thanks to the Chairman for his able and courteous conduct in presiding over the meeting closed the proceedings.

At the conclusion of the General Meeting, a Special Meeting was held, when the following candidates were balloted for, and duly elected members of the Society:—

Alexander, Alfred	1, Tollington-park, Hornsey-road, N.
Austin, James B.	Glebefield House, Park-road, Stoke Newington, N.
Barker, R. Jones, K.L.	Gloucester-road, Regent's-park, N.W.
Catterson, Stephen	Bank of England, E.C.
Croggon, Thomas J.	22, Kensington-gardens-square, W.
Davis, Francis L.	13, Blandford-street, Portman-square, W.
Doran, John, LL.D., F.S.A.	21, Royal-crescent, Notting-hill, W.
Driver, Robert Collier	4, Whitehall, S.W.
Fergusson, William, F.R.S.	16, George-street, Hanover-square, W.
Fielder, Henry	20, Carlton-villas, Maida-vale, W.
Gabb, John Baker	14, Highbury-place, N.
Gabrielli, Antonio	6, Queen's-gate-terrace, Kensington, W.
Gaffin, Edward	63, Quadrant, Regent-street, W.
Galloway, Robert	22, Florence-terrace, New Cross road, S.E.
Garrot, Joseph Nicholas	Wyndham House, Carlton-hill, St. John's-wood, N.W.
Garside, James	Hadley-green, near Barnet, N.
Gibson, John	11, Westbourne-square, W.
Gibson, John Rowland	10, Russell-square, W.C.
Gilbert, James	2, Devonshire-grove, Old Kent-road, S.E.
Giles, John	2, Verulam-buildings, Gray's-inn, W.C.
Gillett, William	28, Bedford-square, W.C.
Gilpin, William	Christ's Hospital, Newgate-street, E.C.
Harradine, Thomas	7, Laurence Pountney-hill, E.C.
Heap, Charles Rogers	12, Upper Baker-street, N.W.
Johnson, Edmund	3, Castle-street, Holborn, E.C.
Mackeson, Edward	59, Lincoln's-inn-fields, W.C.
McMaster, James N.	5, Queen's-gate-terrace, W.
Nicholson, Sir Charles, Bart.	5, Cleveland-row, St. James's, S.W.
Phear, John Budd	7, Fig-tree-court, Temple, E.C.
Williams, Terrick J.	12 and 13, Tichbourne-street, Quadrant, W.

And as Honorary Corresponding Members,

Ducommun, Elie, Chancelier d'Etat	Genève.
Ferrini, Le Docteur Giovanni	Tunis.

EXAMINATIONS, 1863.

The Examiner in English History has awarded a certificate of the 3rd class to—

No. 38—Pilling, James, aged 25, Bacup M.I., Cotton-weaver.

FRAUDULENT ASSUMPTION OF EXHIBITION AWARDS.

A meeting of prize medallists, and gentlemen interested in the Exhibition Awards, was held on the 18th inst., in the Society's Great Room, by permission of the Council, for the purpose of considering the best steps to be taken for protection against the assumption by non-exhibitors and others who had not received awards, of Medals as trade marks and otherwise. It appeared, by a decision in the Vice-Chancellor's Court, that there was at present no legal power to restrain non-exhibitors, or those who had not received awards from the jurors, from fraudulently representing themselves as medallists for trade purposes.

Mr. Alderman Copeland presided, and amongst the gentlemen present were Sir C. Wentworth Dilke, Bart.; B. Oliveira, Esq., M.P.; W. H. Bodkin, Esq., Assistant-Judge; Messrs. Thomas Page, John Bell, W. Hawes, S. C. Hall, E. M. Underdown, J. G. Crace, W. F. Coles, W. J. Townsend, H. L. Keeling, H. W. Vallance, and Edmund Johnson, Hon. Sec., &c., &c. Also gentlemen representing the following firms:—Messrs. Peek, Frean and Co.; J. and J. Colman; Wheeler, Wilson and Co.; Clark and Co., Paisley, the Glencowe Company; J. Broomhall; W. P. and G. Phillips, Bond-street; Charles Ogleby and Co.; J. and J. Hopkinson; Toulmin and Gale; Jackson and Graham, Oxford-street; Batty and Co.; Orlando, Jones and Co.; Tomlin, Rendell and Co.; J. Brook and Bros., Meltham Mills; The Patent Plumbago Crucible Co.; M. H. Blanchard; G. N. Manly; G. R. Ware; J. W. Mackie, Edinburgh; J. Hart and Son, Wych-street; W. H. Bailey; Hooper and Co., Haymarket; J. G. Ghislin; W. B. Crisp; J. W. Allen; G. Sayer and Co., Cognac; C. Challen and Son; Cox and Gould; Copland and Co., Bury-street; Guinness and Co.; Goodhall and Dinsdale; Jones, Randell, and Way; Dakin and Co; W. Huskisson and Sons; Newton Wilson and Co.; Elliott Bros.; J.

Figgins; J. Brinsmead; Salt and Co., Burton-on-Trent, &c., &c.

The Chairman stated that he had been called upon by some gentlemen to whom medals had been awarded at the late Exhibition, and who represented that persons who had not received such awards, and others that were not even exhibitors, were now assuming the use of the prize medals for the purpose of promoting the sale of their goods. Such a course he could only stigmatise as a fraud. He did not like strong language, but on an occasion like that he thought it was best to speak out. If those who were not entitled to medals represented to the public that they had received such medals for the purpose of inducing the public to purchase their wares, they not only committed a fraud upon the public, but seriously injured those whose merit had entitled them to medals, and, at the same time, depreciated the value of them in the eyes of the public. Many of the medallists felt this to be the case, and had called this meeting for the purpose of adopting such measures as would tend to check that practice. It would be for them to consider whether they would go to Earl Granville and get him to place himself at their head, or whether other resolutions should be adopted.

The first resolution was moved by Mr. Gale, who strongly deprecated the system of fraud to counteract which this meeting had been called. The resolution, however, being considered as couched in too moderate terms—

Mr. H. S. Way suggested the following as an amendment:—

"That, in the opinion of this meeting, the use of the Exhibition prize-medal of 1862, or that of any other previous Exhibition, by any person or persons other than those to whom such medals have been awarded by her Majesty's Commissioners, under the direction of the jurors, is a direct fraud, tending to deceive and mislead the public, to injure the authorised medal-holders, and to subvert the objects ot the Exhibitions."

Mr. S. C. Hall suggested that the words "honourable mention" should be inserted in the resolution.

Mr. Way thought the medals should be one resolution, and "Honourable mentions" another.

Mr. E. M. Underdown approved Mr. Hall's suggestion, and afforded the meeting some very pertinent explanations of the bearing of the question with reference to the Merchandise Marks Act, 1862.

Mr. Keeling, as a juror, was convinced of the usefulness of the medals for commercial purposes both here and abroad, and considered that those to whom they had been awarded were entitled to protection against this system of fraud.

Mr. H. W. Vallance explained the proceedings that had been taken before Vice-Chancellor Wood, and the regret of that learned judge that he could not reach the dishonest trader.

After some further discussion, Mr. Hall's suggestion was adopted, and the words "and that the resolution equally applies to the term 'Honourable mention,'" being appended, the resolution as now amended was substituted for the original motion, and carried unanimously.

Mr. J. M. Johnson moved:—

"That the prize medallists and others to whom awards were made, consequent upon the superior skill displayed in the articles exhibited, have acquired an interest in the awards which they are now entitled to consider as a property of commercial value."

He considered it a matter of national honour that piracy of the medals should not be permitted to continue, and that the medallists themselves in their own protection, as well as in the interests of foreign exhibitors, should act in concert until successful in checking the present system of fraudulent assumption of medals; otherwise public confidence in future exhibitions would be very materially lessened.

Mr. W. F. Coles seconded the resolution, which was carried unanimously.

Mr. Peter Graham moved:—

"That the late decision of the Vice Chancellor having determined that at present there exists no means by which persons who have not received medals or honourable mentions can be legally restrained from fraudulently representing to the public that they have such medals or honourable mentions, it is expedient that immediate measures be taken to protect the interests of those to whom medals or honourable mentions have been awarded by the juries of the International Exhibition."

Mr. Hunt seconded the resolution, which was carried unanimously.

The meeting then proceeded to the appointment of a Committee for the carrying into effect of such measures as, on behalf of the Prize Medalists and "Honourable Mentions," might seem most desirable, and the following gentlemen were nominated, with power to add to their number:—Mr. Alderman Copeland, M.P.; Sir James Duke, Alderman, M.P.; Mr. Alderman Mechi; F. Doulton, Esq., M.P.; Mr. Deputy Reed, F.S.A.; Messrs. W. P. Phillips, F. Elkington, P. Graham, W. de la Rue, G. Jennings, J. K. Field, C. Frodsham, G. Batty, J. Colman, J. Bennett, J. M. Johnson, H. L. Keeling, J. Figgins, P. L. Simmonds, H. W. Vallance, E. M. Underdown, S. W. Silver, and Powell.

The following resolution was then unanimously carried:—

"That the Council of the Society of Arts be respectfully invited to nominate some members of their body to co-operate with the the Committee now appointed; and that the best thanks of the meeting be tendered to the Council for kindly placing their room at the disposal of the Prize Medallists."

Mr. Edmund Johnson was thanked for his services, as hon. secretary, in convening the meeting, and requested to continue them. In returning thanks, he said he had received a letter from Earl Granville, expressing his willingness to receive a deputation from the committee. The meeting that day had partially assumed the form of a conference, and he trusted would materially aid in suppressing this particular class of fraud. He thanked them for their attendance, and should have pleasure in continuing his services until the question received satisfactory solution. This might, in his opinion, be effected by legal enactment that the assumption of the medals be held a misdemeanour, under the clauses of the Merchandise Marks Act, 1862. However, they might rest assured that the whole subject would receive the best attention at the hands of the influential committee nominated by the meeting.

The proceedings closed with a vote of thanks to the chairman.

DECIMALISATION OF WEIGHTS AND MEASURES.

The following is the Bill now before Parliament for Decimalising the existing System of Weights and Measures, and for establishing an accordance between them and those of Foreign Countries.* [The notes are by Professor Leone Levi, Barrister-at-Law]:—

Whereas, for the Promotion and Extension of our internal as well as our foreign Trade, it is expedient that the Weights and Measures of the United Kingdom should

* This Bill is introduced by Mr. Ewart, Mr. Adderley, Mr. Cobden, and Mr. Finlay, and stands for a second reading for the 1st July next. Its principal object is to introduce into this country the metric system as it exists in France and most civilised countries, and this may be done in the easiest manner. The Bill does not give a complete nomenclature of all the new weights and measures. It leaves this to be settled afterwards by the Board of Trade. The main point to decide now is the introduction of the metric system, in lieu of the present uncouth manner of weighing and measuring. All other matters of detail will be discussed afterwards. It will be seen that the use of the new weights and measures is made by the Act permissive only for three years, which may be extended to five, but obligatory after that term.

be decimalised and made to correspond with those of other countries: Be it enacted by the Queen's most Excellent Majesty, by and with the Advice and Consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the Authority of the same, as follows:—

1. From and after the Expiration of *Three* Years* after the *passing of this Act*, the Unit of the Measure of Length or Lineal Extension shall in all Cases consist of *Thirty-nine Inches and Thirty-seven thousand and seventy-nine hundred thousandth Parts of an Inch* of the Imperial Standard Measure, and shall be and is hereby denominated the New Yard, or the "Metre," wherefrom and whereby all other Measures of Extension whatever, whether the same be lineal, superficial, or solid, shall be derived, computed, and ascertained, and all Measures of Length shall be taken in Multiples or Decimal Parts of the said New Yard or "Metre."†

2. The Unit of the Measure of Surface shall be the Square of the New Yard, except that the Square of *One hundred* New Yards shall be the unit of Land Measure, and shall be and is hereby denominated the New Acre, or the "Hectare," and all superficial and Land Measures shall be taken in Multiples and Decimal Parts of the said Units.‡

3. The Unit of the Measure of Capacity, as well for Liquids as for Dry Goods, shall be the Cube of a Tenth of the New Yard, and the same shall be and is hereby denominated the New Quart, or the "Litre," and all Measures of Capacity shall be taken in Multiples and Decimal Parts of the said New Quart.§

4. The Unit of Weight shall be the Weight of a New Quart of distilled water, and the same shall be and is hereby denominated the "Kilogram," the Half of which shall be the New Pound, consisting of *One Pound, One Ounce, Three Drams, and Three hundred and twenty-six thousandth Parts* of a Dram Avoirdupois; and all Measures of Weight shall be taken in Multiples and Decimal Parts of the said Kilogram; the thousandth part of the same shall be called the "Gram," which, with its Decimal Parts and Multiples, shall be used for weighing Bullion and Precious Stones, and for the Purposes of Pharmacy.‖

5. For the more convenient Subdivision of Weights and Measures, it shall be lawful to use the Double and the Half of all the said Units and their principal Decimal Divisions and Multiples, as well as any other subordinate Divisions which the Committee of the Privy Council for Trade may deem expedient.

6. The said Weights and Measures hereby established shall be and are hereby denominated the Standard Metric Weights and Measures.

7. Standards of the said New Yard, or the "Metre," the said New Quart, or the "Litre," and the said Kilogram, and of the respective Multiples and Decimal Parts, shall be made under the Direction of the Committee of the Privy Council for Trade, and the same shall be duly verified by Comparison with the Standards in Paris, and Copies and Models of the same Standards shall be sent to the Lord Mayors of London and Dublin, to the Lord Provost of Edinburgh, and to all Counties, Shires, Stewartries, Ridings, Divisions, Cities, Towns, Liberties, and Places in which by Law Copies and Models of the Standard Imperial Weights and Measures are or are required to be kept, and to such other Places and Persons as the President of the Committee of the Privy Council for Trade may from time to time direct.*

8. All Judges, Magistrates, and other Person or Persons who now are or shall hereafter be authorized by Law to order or provide Copies of the present Imperial Standard Weights and Measures, shall at all Times hereafter have like Power and Authority in every respect to order or provide Copies of the Standard Metric Weights and Measures, and to charge the Expenses thereof upon the Fund or Funds, Money or Monies, that would have been liable in case it had been Copies of Imperial Weights and Measures that had been ordered or provided.

9. All and every the Provisions and Provision which are by Law in force with respect to the Inspection, Verification, Reverification, Stamping, Counterfeiting, and Modes of Conviction, with the Penalty or Penalties relating thereto, of the present Imperial Standard Weights and Measures, shall apply to and be in force with regard to the Metric Weights and Measures in every respect as if the Standard Metric Weights and Measures were comprised in and designated by the Imperial Weights and Measures in the Acts relating to such Inspection, Verification, Reverification, stamping, counterfeiting, and Modes of Conviction, and the Penalty or Penalties relating thereto as aforesaid.

10. From and after the Expiration of *Three* Years from the passing of this Act, the Imperial and all local or customary Weights and Measures shall be abolished, and every Person who shall sell by any Denomination of Weights and Measures other than those of the Metric Weights and Measures, or such Multiples or Parts thereof as are authorized by this Act, shall, on Conviction, be liable to a Penalty not exceeding the Sum of *Forty Shillings* for every such Sale.

11. From and after the Expiration of *Three* Years after the passing of this Act, if any Person or Persons shall print, or if the Clerk of any Market or other Person shall make any Return, Price List, Price Current, or any Journal or other Paper containing Price List or Price Current, in which the Denomination of Weights and Measures quoted or referred to shall denote or imply a greater or less Weight or Measure than is denoted or implied by the same Denomination of the Metric Weights and Measures under and according to the Provisions of this Act, such Person or Persons or Clerk of the Market shall forfeit and pay any sum not exceeding *Ten Shillings* for every Copy of every such Return, Price List, Price Current, Journal, or other Paper which he or they shall publish.

12. As soon as conveniently may be after the *passing of this Act*, accurate Tables shall be prepared and published under the Authority of the Committee of Privy Council for Trade, showing the Proportions between the Imperial

* The time may be prolonged to five years, or a clause may be added giving power to Her Majesty to prolong the permissive use of the new system, as provided by the 14th clause, at the expiration of the three years, should it be deemed necessary.

† In Committee it will be better to define the length of the Metre, independent of any number of inches of imperial standard measure, which, of course, would be abolished, and leave no further trace for comparison. The metre is very nearly similar to the existing yard; the fifth part of the metre is just the link, the tenth part is the hand, and the hundredth part is the barleycorn or size. The double metre is equal to the fathom; five metres are equal to the rod or pole; twenty metres are equal to the chain, and two hundred metres to the furlong.

‡ The unit of superficial measure may be denominated a "Square Yard." The word "Are" could not be used together with the "New Acre," inasmuch as "Are" and "Acre" are very like each other, and would lead to mistakes. Ten of the new square yards would be nearly equivalent to the rood. The new acre will be much larger than the present acre; whilst the statute acre is 4,840 square yards, the new acre will be 11,960 square yards, but even now the Cheshire acre in use in many places in Lancashire is 10,240 square yards.

§ The litre is very nearly equivalent to the quart, the half-litre to the pint. One hundred litres are equal to the sack (corn), five hundred litres to the butt or pipe, and one thousand litres are equal to the tun.

‖ The definition of the kilogram and the half kilogram should have no reference to existing weights. The weight of the half kilogram is somewhat mistaken in the Bill, and would be better expressed by 15432·34874 grains, of which our lb. contains 7,000. One thousand kilograms make one ton.

* A Standard Metre is in the possession of the Royal Society, and a Standard Kilogram is deposited at the Royal Observatory, Greenwich. It may be considered whether it would not be better to take these as the standards, or to take further steps for securing the most perfect in existence.

Weights and Measures heretofore in use and the Metric Weights and Measures hereby established, with such other Conversions of Weights and Measures as the said Committee of the Privy Council for Trade may deem necessary, and after the Publication of such Tables all future Payments to be made shall be regulated according to such Tables.

13. And whereas the Weights and Measures by which the Rates and Duties of the Customs and Excise, and other Her Majesty's Revenue, have been heretofore collected, are different from the Metric Weights and Measures directed by this Act to be used: It is hereby enacted, That so soon as conveniently may be after the *passing of this Act*, accurate Tables shall be prepared and published under the direction of the said Committee of the Privy Council for Trade, in order that the several Rates and Duties of Customs and Excise and other Her Majesty's Revenue may be adjusted and made payable according to the respective Quantities of the legal Standards directed by this Act to be used, and that on the Expiration of *Three* Years after the passing of this Act the several Rates and Duties thereafter to be collected by any of the Officers of Her Majesty's Custom or Excise, or other Her Majesty's Revenue, shall be collected and taken according to the calculations in the Tables to be prepared as aforesaid.

14. From and after the Expiration of *Three* Months after the passing of this Act, and until the use of the Metric Weights and Measures shall be made compulsory, the said Metric Weights and Measures shall be deemed and taken to be legal Weights and Measures, and as such may be used for all purposes whatsoever.

The following reasons in favour of the Bill are issued by the International Decimal Association:—

1st. The uniformity in Weights and Measures which it has always been the great object of the Legislature to establish, is defeated by the vast variety of Weights and Measures in use in every part of the country and in many branches of trade.

2nd. The existence of so many Weights and Measures other than the Imperial, proves that we do not at present possess a system adequate to the requirements of trade, and adapted to daily intercourse, and to the purposes of science.

3rd. The Metric Weights and Measures are universally admitted to fulfil the conditions of a sound and convenient system.

4th. This system has been adopted not only in France, but in Belgium, Holland, Spain, Italy, Portugal, Germany, Switzerland, and Greece, and is rapidly extending over other parts of Europe and in America.

5th. The increase of our trade with those countries which use the Metric Weights and Measures renders its adoption by ourselves a matter of great practical importance.

6th. The permissive use of Metric Weights and Measures is highly expedient for the purpose of legalising the transactions now carried on according to that system.

7th. The country has already expressed itself in favour of the Decimal method of calculation, on which the Metric System is based.

8th. The Metric Weights and Measures admit of binary divisions.

9th. By decimalising the Weights and Measures we best pave the way for the decimalisation of our coinage.

10th. Extensive inquiries have proved that the introduction of the proposed system would secure an immense saving of time in education.

11th. The adoption of the Metric System has been decidedly and unanimously recommended by a Committee of the House of Commons, after most careful inquiry and discussion.

Progress of the Metric System in Northern Europe.

On the 18th, 19th, and 20th May, the Scandinavian International Meeting for Political Economy held its first assembly at Gottenburg, and was attended by 467 Swedish, Norwegian, and Danish noblemen, members of the three Parliaments, and other gentlemen of high consideration and influence, Ol. Im. Fähraus, Ex-Minister and Governor of the Province, in the chair, when it was resolved:—

"That it is expedient to adopt the French Metric system, with its attendant sub-divisions and denominations for weights and measures, in the three Scandinavian countries, and in the same way."

"That the French franc of five grammes, nine-tenth parts silver, and one-tenth part copper, be adopted as the unit of the Scandinavian coinage, and with decimal subdivisions."

Home Correspondence.

DECIMALISING WEIGHTS AND MEASURES.

Sir,—The Bill at present before Parliament for decimalising our weights and measures has only been incidentally noticed in your columns, in connection with one of the recent Committees, but it is a matter of such general importance that perhaps you will allow me to make a few observations on it. Probably its destiny will depend entirely on its supposed relation to the operative and poorer classes of society, and if the promoters of the Bill expect to succeed, they must be prepared for every point of detail as viewed in this aspect, and it is in this relation I wish to discuss it. There are, no doubt, some practical objections to its general adoption, and it will not do for the advocates for the change to ignore those, but to examine them in detail, and show how they are, at least, to be mitigated. Viewed in this relation, it appears to me the chief deficiency of the Bill is that no suggestions are made to give simple names to the various weights and measures. There will be no difficulty with the metre, which in itself is simple enough, although no doubt it will be superseded by the more familiar term "yard," but should a mother wish to send her child to a draper's shop for two nails of muslin, the term "decimetre" will certainly not do. Could not the tenth of a metre be called a "hand," the term is now in use for measuring horses for about the same quantity? The bulk of tea, which many such persons purchase, is about five decagrammes. Are customers about as high as the counter to be expected to ask for it in these words? There must be a simpler word for the "decagramme." Would not "clove" do? It is a provincial term for a much larger weight, with which it could not be confounded, and any child could ask for four or five cloves of tea. The term "stone" could, perhaps, be appropriately applied to the myriogrammes, as also the term "wey" to ten myriogrammes, being about equal to two cwt. The litre is so near the present quart that no doubt the present terms would be retained for the smaller measures, but the hecatolitre must surely be recast into Saxon. Will not the well-known "barrel" do? A thilolitre is almost exactly a ton, and no change will therefore be required. The Bill suggests that gram should be used instead of gramme. In a petition adopted by the Pharmaceutical Society in favour of the measure, they suggested that for medicinal purposes gramme should be retained to prevent mistakes in confounding gram with grain. This is very important, but if both terms were legalised, the shorter would be preferable for general use, and the College of Physicians could make the other obligatory in medicine.

It is an important question as to how the change would be viewed by the poorer classes, but there are two or three matters of detail which, when brought into contact with their immediate interests and prejudices, would materially soften the way for the change. A thrifty housewife, on finding that a yard of calico was only 35 inches, may, perhaps, consider herself cheated of the other inch, but the new yard being three inches more than the old one,

will help to reconcile her to the change, and probably, with regard to some goods, the advantage will be more than imaginary, for now retail drapers buy many of their goods by the metre, and in calculating their profit, perhaps sometimes now forget the difference between the yard and the metre. Again, if the proposed new pint had happened to have been a teaspoonful less than the old, it would have been received in some quarters probably with very strong epithets of disapproval; but as it happens to be a little more, and yet not sufficient to increase the price (although, of course, the brewers may be trusted for duly adjusting the quality), the additional sip will no doubt help to wash down the little inconveniences attending a state of transition.

Although there is no reference in the Bill to money, should this Bill be passed, the pound will surely be soon decimalised, as the change can be so easily made. I may, therefore, be allowed to refer to one very important fallacy, which I have been surprised to hear brought forward as an objection by men who ought to know better, in more than one of the animated discussions on this subject at the meetings of the British Association. It has been contended that the depreciation of the copper coinage by making the pound to consist of a thousand farthings instead of 960 would militate against the poor. This appears to me to be a great mistake. Men, as a rule, are paid in silver, and spend in copper. A man earning two shillings per day would then be able to buy 25 penny oranges instead of 24. This short concrete illustration will, perhaps, make my meaning as plain as a longer and more abstract argument.

Although I would not lengthen this letter by going over the many arguments in favour of the change, its important bearing on national education may be appropriately alluded to in this *Journal*.

Is it too much to say that the decimal system, fully and completely carried out, would be equivalent to a vote of at least a quarter of a million annually to our day schools. It would simplify the whole system of popular arithmetic, and more than that, it would certainly tend to a more general and popular appreciation of the whole theory of numbers, so that the work of a schoolmaster in this respect would be reduced to a minimum scarcely conceived of by practical men who have not directed their attention particularly to this point.

I am, &c.,

W. SYMONS, F.C.S.

17, St. Mark's-crescent, Regent's-park.

To Correspondents.

Erratum.—In last *Journal*, page 536, col. 1, line 19, before "be abolished," insert "not."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 19th*, 1863.]

Dated 11th March, 1863.

669. A. Barclay, Kilmarnock, Ayr, N.B.—Imp. in traction engines, and in apparatus for indicating the pressure of steam.

Dated 21st April, 1863.

997. W. Ryan, 17, Fishamble-street, and W. Daniel, 55, Mary-street, Dublin—Imp in apparatus for transmitting, equalising, and registering human power.

Dated 28th April, 1863.

1062. G. Hall and J. Wells, Worcester—A new explosive compound applicable for all the purposes for which gunpowder is or may be used.

Dated 8th May, 1863.

1157. E. C. Boet, Lille, France—Imp. in tanning hides and skins. (A com.)

Dated 11th May, 1863.

1180. C. L. V. Tenac, Tredegar, Monmouthshire, South Wales—A new wrought-iron railway sleeper (A com.)

1181. C. L. V. Tenac, Tredegar, Monmouthshire, South Wales—Armour plates of hammered or rolled wrought iron, the whole of the rivets being protected against the direct blows from the cannon shots.

Dated 21st May, 1863.

1273. F. P. Warren, East Court, Cosham, Hants—Imp. in attaching copper or other sheathing to iron vessels.

1281. R. A. Brooman, 166, Fleet-street—Imp. in breech-loading ordnance, breech-loading and other small arms and projectiles. (A com.)

Dated 23rd May, 1863.

1292. J. Sturgeon, Leeds—Imp. in steam hammers.

Dated 25th May, 1863.

1318. M. J. Roberts, Pendarren, near Crickhowell, Breknock—Imp. in means of and apparatus for preparing, spinning, twisting, and doubling wool, cotton, and other fibrous substances, and in lubricating the spindles and other parts of machinery used in these and other operations.

1319. J. W. Burton, S. G. Rhodes, S. E. Seanor, Leeds, and W. Scruton, Liverpool—An improved machine or apparatus for getting coal or other minerals.

Dated 1st June, 1863.

1364. J. Chalmers, 8, Knight's-place, Vauxhall—Imp. in armour for forts and floating batteries.

1366. F. W. Smith, 180, Upper Thames-street—An improved apparatus for conveying of goods either in bulk or otherwise, whether to or from the warehouse or vessel having an inclined vertical or horizontal movement, to be worked either by pressure of air or by vacuum and atmospheric pressure.

Dated 2nd June, 1863.

1380. E. H. Létang, 12, Rue du Chemin de Reuilly, Paris—An improved ruling and printing machine to be used either combined or separately.

Dated 3rd June, 1863.

1384. J. Travis, Luzley Brook, Royton, Lancashire—An improved method of preventing the incrustation of earthy matter in steam boilers, steam generators, and fuel economisers.

1388. W. Lee, 23, Sumner-place, Onslow-square, and J. G. Winter, 73, Great Suffolk-street, Surrey—Imp. in steam fire-engines. (A com.)

Dated 4th June, 1863.

1400. R. W. Sievier, Guildford-street, Russell-square—Imp. in jacquard machines. (A com.)

1402. R. A. Brooman, 166, Fleet-street—Imp. in treating liquorice root to obtain liquid or solid extracts therefrom. (A com.)

1406. J. H. Johnson, 47, Lincoln's inn-fields—Imp. in smoothing irons. (A com).

Dated 8th June, 1863.

1412. N. Walton, Aldenham-street, St. Pancras—Imp. in apparatus for drying and airing clothes.

1416. W. Clark, 53, Chancery-lane—A new and useful device for turning cross head wrists or pins, or for turning any cylindrical part of machinery which is secured between two arms. (A com.)

1420. J. G. Jones, Cumming-street, Pentonville, and R. Ridley, Leeds—Imp. in machinery and apparatus for working coal and other mines.

1422. R. C. Furley, Edinburgh—Imp. in the preparation of castor and other oils for medicinal use.

1424. W. E. Newton, 66, Chancery-lane—An imp. in needles. (A com.)

1426. J. Petrie, Rochdale—Imp. in machinery or apparatus for washing wool or other fibrous materials.

Dated 9th June, 1863.

1428. G. Hills, Blackheath, Kent—Imp. in obtaining certain products from hops.

1430. E. Barlow, Bolton, J. Newhouse, Farnworth, near Bolton, F. Hamilton, and W. Hope, Bolton—Certain imp. in machinery for grinding card teeth.

1432. J. Edwards, 29, Basinghall-street—Imp. in railway chairs and sleepers.

1434. J. Murray, Whitehall-place—Imp. in clips or holders for inserting and fixing photographic pictures in albums.

1436. M. Siegrist, Ewell, Surrey—Imp. in the construction of fountains.

1438. Capt. H. F. McKillop, R.N., Belvedere, Kent—Imp. in compositions for coating or covering ships' bottoms.

Dated 10th June, 1863.

1440. W. Madders, Manchester—A new and improved ornamental fabric.

1442. W. Roberts, Millwall, Poplar—Imp. in steam boilers.

1446. T. Evans and E. Hughes, Manchester—Imp. in apparatus for applying one or more colours of ink to type in letter-press printing by hand.

PATENTS SEALED.

[*From Gazette, June 19th*, 1863.]

June 19th.

3417. R. A. Brooman.
3427. G. Haseltine.
3435. A. P. Tronchon.
3438. W. Henderson.
3444. J. Taylor.
3445. J. Lord and W. Lord.
3454. E. T. Loseby.
3470. J. Johnston.
20. J. E. Dowson.
276. F. G. Stuber.

Journal of the Society of Arts.

FRIDAY, JULY 3, 1863.

COUNCIL.

Wednesday, 30th June, 1863.

At the First Meeting of the present Council since their election, William Hawes, Esq., Vice-President, was unanimously elected Chairman for the current year.

PRIZES TO ART-WORKMEN FOR ART-WORKMANSHIP.

The following notice has been issued by order of the Council* :—

I. The Council of the Society of Arts hereby offer prizes to Art-workmen for the successful rendering of the undermentioned designs in the undermentioned processes of manufacture, according to the directions detailed in each case.

II. Such designs will be by artists of great reputation, to be translated into the various modes of workmanship, and photographs and castings of such designs will be sold by the Society, at the Society's House, at cost price, to persons desiring to be competitors.

III. The works to be executed will be considered to be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

IV. The exhibitors are required to state in each case the prices at which their works may be sold, or if sold previously to exhibition, at what price they would be willing to produce a copy.

V. The awards in each class will be of two grades, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the award; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

VI. The prizes will be presented publicly. Before the award is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

1. Modelling in Terra Cotta, Plaster, or Wax.

(*a.*) *The Human Figure in bas-relief.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's design of the "Three Graces."* Dimensions—The figures are to be 9 inches high.

[Photograph—One shilling.]

(*b.*) *Ornament in bas-relief.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas van Leyden, 1528. Dimensions, 12 inches by 6 inches.

[Photograph—Sixpence.]

2. Repoussé Work in any Metal.

(*a.*) *The Human Figure as a bas-relief.*—A prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's "Three Graces."* Dimensions—The figures are to be four inches.

[Photograph—One shilling.]

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a Flemish salver in the South Kensington Museum, date about 1670, No. 1153. Dimensions—Diameter, 10 inches.

[Photograph—One shilling.]

* Copies may be had on application to the *Secretary*.

3. Hammered Work, in Iron, Brass, or Copper.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after an iron German arabesque, about 1520, in the South Kensington Museum, No. 2450. Dimensions—12 inches by 1½ inch.

[Photograph—One shilling and threepence.]

4. Carving in Ivory.

The Human Figure in bas relief.—One prize of £10 for the best and a second prize of £5 for the next best, work executed after a Terra Cotta ascribed to Luca della Robbia, about 1420, in the South Kensington Museum, No. 7610. Dimensions—The plaque to be four inches high.

[Photograph—One shilling.]

5. Chasing in Metal.

(*a.*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after a reduced copy of *Gibson's "Psyche."*

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society, price, 12s. A plaster cast may be obtained from D. Brucciani, 39, Russell-street, Covent-garden, W.C., price, 3s. 6d.

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a bronze plaque in the South Kensington Museum, No. 1217.

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society, price 1s.

6. Enamel Painting on Metal, Copper, or Gold.

(*a.*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's design of the "Three Graces,"* executed in *grisaille*. Dimensions—The figures are to be four inches high.

[Photograph—One shilling.]

(*b.*) *Ornament in grisaille.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a German arabesque (16th century). Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

7. Painting on Porcelain.

(*a*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's "Boy bearing Doves,"* in the cartoon of the "*Beautiful Gate.*" Dimensions, the same as the Photograph. This work is to be coloured according to the taste of the painter.

[Photograph—Ninepence.]

(*b.*) *Ornament.*—One prize of £5 for the best and a econd prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, 1528, and coloured according to the taste of the painter. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

8. Inlays in Wood (Marquetry, or Buhl), Ivory or Metal.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a majolica plate in the South Kensington Museum, 1490, No. 1671. Dimensions—The same as the Photograph.

[Photograph,—One shilling and threepence.]

9. Engraving on Glass.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, 1528, engraved the height of the photograph; and if round a glass or goblet,

repeated so as to be not less than 9 inches long when stretched out.

[Photograph—Sixpence.]

10. Embroidery.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a German example in the Green Vaults at Dresden. Dimensions, according to the taste of the embroiderer.

[Photograph—Sixpence.]

The Council cannot hold itself responsible for any accidents or damages of any kind, occurring at any time.

Each work must be marked with the name of the Art-workman, or, if preferred, with a cypher, accompanied by a sealed envelope, giving the name and address of the Art-workman, and delivered free of all charges, at the Society of Arts House, John-street, Adelphi, London, W.C., on or before the 31st August, 1863.

The Council desire to remind those who propose to be competitors, that they should make known their intention before the 15th of July, and as much earlier as possible. This information is necessary to enable the Council to make suitable arrangements for the distribution of the awards.

EXHIBITION OF WOOD-CARVING.

On Friday evening, the 26th June, the members of the Wood-Carvers Society and their friends were invited to a special inspection of the works exhibited. The following gentlemen interested in this branch of art were invited to meet them:—Sir Thomas Phillips, Messrs. John Bell, Harry Chester, Henry Cole, C.B., J. G. Crace, J. Hunter Donaldson, C. H. Dresser, W. Dyce, R.A., Peter Graham, S. C. Hall, William Hawes, W. Holland, A. J. B. Beresford Hope, John Jackson, Owen Jones, J. C. MacDonald, Richard Redgrave, R.A., Samuel Redgrave, G. Gilbert Scott, R.A., John Stewart, J. B. Waring, R. N. Wornum, A. Wright, M. Digby Wyatt, and H. Vaughan. Mr. John Bell, member of the Council, took the chair.

The Chairman stated that the present was not a formal meeting, but simply an occasion for inspecting the works exhibited and declaring the awards of the judges, which he would now call upon the Secretary to read.

The awards (which will be found at page 548 of the *Journal*) having been read,

The Chairman asked Mr. Digby Wyatt, one of the judges, to favour the meeting with some remarks.

Mr. Digby Wyatt said he was glad to have this opportunity of meeting the Society of Wood Carvers, feeling that their art was one to which architects were largely indebted in carrying out their designs. One good result of such exhibitions and meetings as the present must be to bring more closely together the art-workman, the designer, and the patron of art, and this could not but exercise a beneficial influence upon all. Mr. Wyatt referred to the extended educational facilities which now surrounded the art-workman, and to various remarkable examples of wood-carving abroad, suitable as models for study and imitation, particularly to some of which he had obtained castings for the Crystal Palace. In reference to the awards of prizes in the present exhibition, he said it might be asked why the judges did not award the first prize in the first division. His answer was that, where subjects involving much difficulty had been attempted, great success had not been attained. The most successful specimen in this department was a subject of a comparatively simple and well-known character, and to this (the figure of Apollo) they had awarded the second prize. In the second and other divisions the judges had recognised merit of the highest order, and had awarded not only all the prizes offered, but extra ones as well. He might observe, that in the production of such subjects as are included in this division, it was important that, in modelling the design in clay, the treatment should be broad and free, but when produced in wood more finish must be given, otherwise the effect would be unsatisfactory; at the same time an excess of detail, degenerating into mere slavish imitation, was a fault even more to be avoided than too much freedom and sketchiness of execution, because the spirit of true art was altogether lost when too much imitative labour was visible. He hoped that, on a future occasion, the exhibition would include photographs and sketches of any great works produced in this department of art during the year, thus supplying the void occasioned by the absence of other than cabinet specimens from such an exhibition; and that architects would assist by sending examples of work produced from their designs, and for which it might be well to offer honorary premiums. Another class whose interest in the art might be greatly stimulated by the offer of "honour to the worthiest" was that of the purchaser, a class needing enlightenment and encouragement even more than the artists. For many years past architects had not, in his opinion, sufficiently appreciated the value of wood-carving as a structural adjunct, though in former days it would be remembered how largely and successfully it was employed. Mr. Wyatt then referred to some of the most remarkable specimens of wood-carving in France, Belgium, Holland, Italy, Germany, and Spain. In France, during the reign of Henry II., wood carving was carried to its highest perfection. There was extreme simplicity of treatment, and the manner in which fine contrasts of light and shadow were obtained without high relief showed the highest skill. Holland and Belgium were singularly rich in this art; the screens and pulpits in the churches in the latter country were works of the greatest excellence. The Rubens style of carving, as it had been called, was admirable, not that Rubens was a carver, but that his designs and those of his school were full of freedom, and their execution, as shown by some of the examples at Antwerp, Brussels, Louvain, Bruges, &c., was of great merit. To return to the present time, no one could fail to recognise in the late International Exhibition what great progress had been made in this art in England since 1851. The French fully recognised this fact, and every Frenchman on the jury, of which he (Mr. Wyatt) was a member, had paid a well-deserved tribute to the wood carvers of this country, from whose rapid advance towards excellence it was felt how much might be hoped for in the future. This was mainly due to the employment in such establishments as that of Messrs. Trollope, and others, of able artists and foremen, who could not only design, but could also, if need be, execute the design, and so were able to instruct, and practically direct to a successful issue the labours of the workman. In the present exhibition the works contributed by Mr. Kendall, of Warwick, were an illustration of what could be produced by an employer, who was at the same time an able designer and a skilful workman. [Throughout his address Mr. Wyatt practically illustrated his remarks by frequent reference to the works of art comprised in the exhibition.]

Mr. Lock read a letter he had received from Mr. Harry

Chester, regretting his inability to attend the meeting. Mr. Lock observed that the Wood Carvers Society felt much indebted to Mr. Chester for having introduced them to the Society of Arts, and thus led to the present exhibition, which he hoped would only be the first of a series. He thought that, on a future occasion, it would be desirable to add to the works of the competitors any remarkable specimens of carving which could be borrowed from their owners. These would afford valuable instruction to the workman. Specimens of carving of an architectural and conventional style might also be introduced with advantage. On a future occasion it would be desirable to announce the conditions of the competition at an earlier date, so as to afford more time for the production of works for exhibition. He hoped Mr. Stewart would favour them with some remarks upon the present state of this art in Italy.

Mr. Stewart complimented Mr. Wyatt upon the interesting remarks he had made on the present occasion. He (Mr. Stewart) felt great interest in all matters connected with art industry. The laws of proportion and rules of art applicable to sculpture generally were those applicable to wood-carving. The study of proportion in nature was the best preparation for an art-workman who really desired to excel, for it was only by patiently observing and carrying out those proportions in art that beauty and variety were attained. The Society of Arts was doing a good work in encouraging such exhibitions as the present. The history of the Society showed how much it had done to foster Art in the last century, and he was glad to find that it was now specially directing its attention to the Art-industries of the country. Mr. Lock had asked him to say a few words on the state of the art of wood-carving in Italy, but he thought that Mr. Wyatt was much more capable of doing so than himself, and he ventured to hope he would add something to the interesting remarks he had already made.

Mr. Wyatt said, that having studied his profession for two years in Italy, he had naturally paid attention to many of the principal monuments, as they might be called, of the art of Wood Carving in that country. In comparing the technical arts of Italy with those of other countries of Europe, it was always to be remembered that Gothic art was an importation rather than a creation. The great abbeys and cathedrals of England and France, sumptuously decorated with carved stall work and screens, had many of them reached a pitch of rare perfection before the Germans transplanted the pointed style to the North of Italy. The wandering Greeks, who, during the early part of the 13th century, were the principal artificers in Italy, unquestionably possessed a power of minute carving in wood which their descendants had retained to the present time, as might still be seen in the curious tablets decorated with multitudes of almost microscopic figures, which were produced in the monasteries of Mount Athos and the Levant. It was not, however, until some time after the revival of sculpture under the Pisani that Italian wood-carving made any conspicuous figure. The most complete set of Gothic stalls he remembered was that which existed in the Cathedral of Palermo. In general style of execution they differed little from cotemporary works of the early part of the 15th century in the Western countries of Europe. In the mixed style, half Gothic, half Renaissance, much very beautiful ecclesiastical wood work had been executed, and in the stalls of the Chapel in the town-hall of Sienna, a very remarkable specimen of the skill the Italians had acquired in the combination of wood carving with marquetry in the early part of the 15th century, was to be met with. The stalls of the Church of St. Francis, at Assisi, were little less remarkable. From about the year 1300, a large number of graceful ivory carvings were produced in Italy, proving that in cabinet objects very considerable dexterity prevailed. These differed from the cotemporary works of France and England, mainly in the amount of marquetry by which they were adorned; this art there was no doubt the Italians acquired from their early intercourse with the nations of the East, by way of Pisa, Genoa, and Venice. From whatever source this decorative adjunct might have been acquired, there was no doubt that it tended to greatly enrich the effect of the furniture, and general decorations in ornamental woods, which, from the year 1400 onward, increased and multiplied in the palaces and churches of that nursery of the arts. It was, however, with the great revival of antique art that they must mainly associate the creation of a great school of wood carving in that country. To Donatello and Brunelleschi must be awarded the honour of having first devoted their attention to the production of real artistic sculpture in wood. Fellow students at Rome, they had together examined all the relics of antiquity preserved in that locality and, until the later circumstances of his career drew Brunelleschi altogether away from sculpture to the practice of architecture, they executed many beautiful works, more or less in rivalry. The most notable instance of this was recorded by Vasari, who relates that Donatello, having been engaged to execute the crucifix in wood, now preserved in the church of Santa Croce at Florence, showed it to Brunelleschi, who reproached him with his having made his Christ too much like a countryman. A coolness ensued between the friends, and in order to vindicate his superior ability, there was no doubt that Brunelleschi threw all his soul into the execution of the still more beautiful crucifix, which was one of the greatest treasures of the present day in the Church of Santa Maria Novella, in the same city. The story ran that when Donatello went to look at Brunelleschi's work with him he had his apron full of eggs and cheese, which, on catching sight of the crucifix, he let fall, and, turning to Brunelleschi, said, "Thou art gifted to make gods; I, countrymen only." Whatever the relative position of the two artists might have been at that early period in their career, there was no question as to the infinite superiority Donatello ultimately attained in every class of his art, and he (Mr. Wyatt) knew no master whose productions were more worthy of study by the wood carver of the present day. He excelled especially in the art of contrasted relief, and in a consummate knowledge of the effects to be produced upon the quality of shadows by undercuttings, and the use of reflecting surfaces. No one, since the days of the Romans, whose works he so profoundly studied, had so well succeeded in giving effect in the lowest possible relief. Some of his most remarkable works scarcely exhibited a greater salience in any part from the ground than about a quarter of an inch, and yet, by a careful attention to the delicate undulations of the surface, and knowing exactly where to incise, he had managed to produce an amount of dramatic expression and apparent rotundity which was almost incredible. Happily, through the excellent taste and praiseworthy exertions of Mr. Robinson, the South Kensington Museum now contained an invaluable collection of the works of that artist, and of his most able cotemporaries, which could be rivalled in no other country of the world. Among their co-temporaries and successors, the most notable in the art of wood carving were probably Baccio d'Agñolo, the author of the great "*cantoria*" from the church of Santa Maria Novella, at Florence, now in the South Kensington Museum; and Benedetto and Giuliano da Maiano. Because the names of a great number of such artists were not preserved to us, it was by no means to be supposed that there was any dearth of skilful professors of that art, since the multitude of monuments which abound in almost every church, monastery, and palace in Italy left no doubt, not only of their number, but of their talent and most prolific industry. The objects upon which their energies were principally concentrated were carved doors, screens, pulpits, linings to rooms, fittings to sacristies and shops, such as the "*spezzerie*," or drug stores, attached to many of the principal monastic establishments. In furniture, two objects were particularly selected for decoration by the wood carver, the one the great

chest, or *cassa panca*, in which the linen and many of the valuables of an Italian household were usually preserved, the upper portion of which served as a settle or large seat, the other the *cassone* or large chests in which the trousseau of the bride, and sometimes her dowry were generally kept. The cabinet was a later piece of furniture and attained its greatest perfection in the great ebony cabinets wrought with marvellous skill at Venice, in the latter part of the 16th century, and subsequently well imitated in France and Germany; one, in the posession of Mr. Holford, in this country, was of the highest order of excellence. For the design of wood carving as applied to church decoration on a large scale the ablest artists were employed, while the execution was entrusted to the ordinary makers of furniture, who had their shops in all the principal cities. Thus, at Perugia, might still be seen, in the Church of St. Agostino, the carvings in the choir by Angelo Fiorentino, after the designs of Pietro Perugino. These were enriched with the most graceful marquetry. The example of Perugino was followed in the same city by his great pupil Raffaelle, whose arabesques on the stalls of the Church of S. Pietro dei Casinensi, executed by Stefano da Bergamo were probably the most beautiful specimens of wood carving now extant in Italy. Michael Angelo, too, in his early years, paid considerable attention to wood carving, and executed a very fine crucifix for the monastery of Santo Spirito at Florence, in the year 1493. Although there was little left so pure in style as these, there was an infinite abundance of that which was more florid, but scarcely less dexterous, in design and execution. The fittings of the great halls in the ducal palace at Venice were admirable examples of this bold design and florid execution, which attained its climax under Andrea Brustolini, while all over the country there were still scattered masses of rococo work, which must have cost vast sums of money, and rarely failed to exhibit a judicious application of the art to architectural embellishment, however faulty in good taste the separate details might occasionally appear to be. The school of Bernini, which, in its florid manner, never hesitated before the difficulties which it presented to the workman in the realisation of the fanciful conceptions of the principal designs, no doubt laid the foundation of that overwrought style, which, passing into France, fluttered and twisted in grotesque, but occasionally very beautiful, combinations of form about the principal monuments of architecture produced during the reign of Louis XIV. The French (as well as the Germans, represented in this country by the immortal Holbein) of the sixteenth century acquired from the Italians a much purer and more elegant style, and, in combination of arabesque with well proportioned mouldings and agreeable conventional ornament, it would be difficult to surpass the bulk of the work produced in the reigns of Francis I. and Henry II. The doors from the church of St. Maclou, at Rouen, by Jean Goujon, of which he (Mr. Wyatt) was fortunate in procuring casts for the Crystal Palace, would well repay the most careful study on the part of any wood-carver of the present day, since, although much dilapidated, in the general scheme of their composition they left little to be desired. The old dexterity of her artists had not been altogether lost in Italy, since it would be in the memory of those present that the large cabinet produced by Barbetti, of Florence, in the Great Exhibition of 1851, successfully competed with the productions of a similar nature of every other country. At Paris, in 1855, in the late Italian Exhibition, and in that of last year, Barbetti still further distinguished himself, and with Giusti, of Sienna, manifested the fact that under proper direction the Italians of the present might fairly rival their great predecessors. Among the contributions from Rome they would no doubt remember a door, beautifully carved and enriched with marquetry, forwarded by the Pope, and intended for one of the apartments of the Vatican. It was his (Mr. Wyatt's) earnest hope that we might at least imitate the Italians in a more serious use of wood-carving than we had hitherto done. The very item last mentioned, that of ornamental doors, could but an emulation be excited as to whose house should have the most beautiful in this country, would suffice to give employment to more than he saw around him for many a long year. They might now walk from one end of the metropolis to the other and scarcely see a single recent external evidence of the power which they certainly possessed, and which that exhibition demonstrated, of enlisting wood into the service of architectural beauty. He trusted that the time was not long distant when they would again see that material really used as it ought to be, not simply worked upon the carpenter's bench, but dealt with more artistically in the studio of the wood carver. If such a result was to be obtained, it was essential that those who practised the art should occupy themselves more with the principles of its judicious combination and arrangement on a large scale, and less with the superficial minutiæ of a pheasant's wing than they now did; in fact, they must for a time, neglect the cuticle in order to rightly apprehend the structure of the skeleton.

Mr. Lock moved a vote of thanks to the Chairman, and to Mr. Digby Wyatt, for their assistance on this occasion. The wood carvers felt much indebted to the Society of Arts for the valuable aid they had rendered them in the furtherance of this art.

These votes having passed with enthusiasm, the meeting separated.

COMMITTEES OF REFERENCE.

COLONIES.

The Committee on Colonies met on Wednesday afternoon, the 1st inst., in conformity with the terms of the resolution agreed to at the last meeting. Lord Alfred S. Churchill, M.P., in the chair.

The Secretary read letters from Lord Lyttelton, Sir Daniel Cooper, Bart., and several others who were unable to attend, many of which contained suggestions for the consideration of the Committee.

Mr. T. M. Mackay writes:—"I beg to say that I think if a communication were made to the various governments, expressing the interest which the Society of Arts takes in the natural development of the Colonies, and that it would gladly extend its honours to those who, by discovery, invention, or even the utilising of products already known, were aiding in this good work, you would find a response from our compatriots all over the world. They are very sensitive, and very proud of such distinctions, and I believe the Colonial Governments would take every means to give the intimation such publicity as would ensure successful results. At a later period it would be time enough to classify the rewards."

Mr. M. H. Marsh, M.P., suggested that flax and hemp were very much wanted, and could be grown to a great extent in many of our colonies. There was also another subject of great importance—the preservation of meat, &c., for shipment. Many of our Australian colonies had a superabundance of beef and mutton, but had no means of exporting it to advantage, whereas in this country it was getting dearer every year, and threatened to be at an extravagant price.

Mr. Arthur Hodgson said that some years ago a trade was opened up in preserved meats, from New South Wales, by Messrs. Dangar and Co., but a difficulty was found in bringing it into general consumption in England, and the Admiralty did not encourage it for naval stores. With the influx of population, arising from the gold discoveries, the colonial consumption and price of meat had

increased, and boiling down stock ceased. Although boiling down had recently been again resorted to, a superabundance of sheep or cattle was not likely to continue long, and therefore it was doubtful whether preserved provisions would pay as a commercial speculation.

Sir Charles Nicholson thought that the Council of the Society might advantageously encourage the production in Australia of many tropical staples of commerce. For instance, a premium might be offered for the manufacture of a ton of cane sugar. A Mr. Hope had already entered upon the cultivation of the cane in Queensland, although the locality selected for the experiment was scarcely the most suitable. Another premium might be offered for the first hundredweight of merchantable coffee grown in Australia. Some of the elevations would also be found as suited to the growth of the tea tree as the hills of India. The introduction of the cinchona trees should also be encouraged, and as there was an increasing demand for elastic gums, and many of the Ficus genus were natives of Australia, the collection of the sap, and the transmission of the crude gum, should be recommended; and a premium for the first quarter of a cwt. of caoutchouc, or any similar elastic gum, would be highly beneficial. There were many indigenous fibres to which attention should also be given. One species of Sida (*S. retusa*), a common weed, was already in commercial demand here at a high price, if it could be shipped in quantity. The *Doryanthes excelsa*, and others, might be mentioned. Then there were various perfumed or scented woods, in request by the perfumer and cabinet-maker, such as the Myall and violet wood; and there was a singular natural green-coloured wood, a species of Grevillea. The dugong and other animal oils also deserved more attention, while the trepang and the pearl fisheries might be prosecuted successfully on the coasts. He thought the proposal to increase the number of corresponding members of the Society in the colonies a very useful one, and he would suggest that it be recommended to the Council to elect the following gentlemen connected with Queensland:—Mr. W. H. Wiseman, Albany Island; M. Thouvet, a very intelligent gentleman, who had been most successful in introducing many new objects of culture, &c.; and Mr. W. Hill, the colonial botanist.

Mr. J. G. Knight would also suggest the nomination of the following gentlemen connected with the colony of Victoria:—Mr. F. Bosisto, chemist, Bridge-road, Richmond; Professor Halford, Melbourne University; Professor Mueller, Director of the Botanic Garden, Melbourne; and Mr. J. W. Osborne, Survey department, Melbourne. He considered that there was ample scope for the mutual co-operation of the Society with the several colonial governments, and that local official influence might be made useful, in public announcements through the Government Gazettes, and in selecting and nominating Local Committees to examine and report upon products and manufactures, and to correspond with the Society. The Colonial Governments should also be moved to support and encourage industrial enterprise and original investigations, by offering similar sums or rewards to those given by the Society of Arts. He would propose:—"That the Council of the Society apply to the various colonial governments for well-selected samples of such products as are likely to be of commercial value, and to lead to an export trade, particularly specimens of the following articles:—Economic minerals, other than gold; coal; timber of useful kinds, where existing in large quantities, and in localities presenting favourable opportunities of shipment; barks; cotton and other fibres; tobacco; wine; preserved fruits; sugar; arrowroot; maize, and preparations therefrom; animal and vegetable oils, and resins. Also, that the Council of the Society of Arts suggest to the different Colonial governments that the Council are prepared to place in the hands of proper authorities in the Colonies gold medals to be awarded to such scientific persons as are willing to undertake the labour of introducing, collecting, or producing specimens of new articles of raw produce, and supplying useful information respecting them. That the Council tender their offices to the Colonial governments for the purpose of acting on their behalf in the adjudication of any rewards the said Governments may be disposed to offer in favour of the development or useful application of such products as are at present either untried or imperfectly used or applied." He (Mr. Knight) thought that the official influence and prestige of the Government in the Colonies might be beneficial, and the delivery of the medals or awards publicly by the Governor would be appreciated. A Committee from the leading Local Scientific Society might be delegated to examine and report upon inventions, discoveries, &c.

Sir Charles Nicholson thought it was scarcely necessary to seek official aid in this matter, which might very well be worked through the assistance of the Societies in Union in the Colonies, or corresponding members. This was an old-established and purely English institution, and the central body sitting in London was that through which primary action should be taken.

Mr. J. G. Knight explained that Government aid had been found eminently useful in Victoria, in the matter of the Exhibition, and otherwise in supplementing reward and stimulating action.

Dr. Milligan thought that in their deliberations the introduction and cultivation of spice plants into Australia ought not to be overlooked. Premiums should be offered for the production of nutmegs, pepper, cloves, &c.

Sir Charles Nicholson remarked that but little was yet to be anticipated in that direction until eastern labour was more plentiful. There was a species of wild nutmeg common in North Australia, and there were several indigenous spice barks, specimens of which had been sent to the Exhibition. He looked for much beneficial result from the exertions of such men as M. Thouvet and Mr. Hill.

Captain Bagot thought that the culture of the vine, and the manufacture of wine, might be considered already established. Cotton culture was a commercial speculation which needed no stimulus with present price. The alpaca and Cashmere goat had been successfully introduced. The olive and oil plants from India, China, and Japan, might be worthy of attention. He thought the efforts of the Committee should be most directed towards the northern parts of Australia, which would ere long be colonised, and offered encouraging fields for enterprise and experiment.

Dr. Milligan thought that premiums might with advantage be held out for:—1. The discovery and development of rich metallic ores, and of other vegetable and mineral products, &c., such as gypsum, graphite, rock salt, and guano. 2. Economy of time, labour, and material in the separation of gold and other metals from their matrix and from their alloys, &c. 3. The introduction into the market of a really good steam-coal, the product of one or other of the Australian colonies. 4. The procuring and applying of very cheap oils from mineral and other sources to the purposes of illumination, of lubricating machinery, and for use in the arts, &c. 5. The introduction into common use of new or lately-discovered essential oils, with their applications in medicine and the arts. 6. The production in adequate quantity and at a suitable price, of a substitute for rags as a material for papermaking, or of substances calculated to come to the aid of the papermaker. 7. The introduction and acclimatising in the Colonies of animals and of vegetables capable of yielding materials calculated to prove extensively useful as articles of food; or for purposes of clothing, silk, cotton, flax, &c., would fall under this head.

After some observations by the Chairman, Mr. P. L. Simmonds, and others, the meeting broke up.

UNIVERSAL EXHIBITION IN PARIS FOR 1867.

The *Moniteur* contains a decree, signed by the Emperor Napoleon, announcing that a universal exhibition of agricultural and industrial products is to take place in Paris from the 1st of May, 1867, to the 30th of the following September. The decree is preceded by a report from M. Rouher, who says:—

"The commission which met on the 5th of June was unanimously of opinion that the industrial and moral advantages of universal exhibitions are becoming more and more evident. Producers have derived much practical utility from them, and their foremen and workmen also. They have learnt to improve their systems of manufacture, and to extend the circle of their commercial operations. The savans and artists who form the international jury generally agree in considering that these competitions stimulate the progress of science and art. Moreover, if this exhibition is arranged so as to attract a large number of our countrymen and foreigners, it will be a considerable source of profit to the city of Paris, while at the same time it will favour the influence of the French nation, and the development of its relations of all kinds. The commission was of opinion that a feeling of just emulation ought to urge France after the Exhibition of 1862 as of that of 1851, to follow England, and attempt for the second time this great undertaking. In addition to these general advantages, there are others which the presence of the savans and industrials of every country enables us to obtain. Thus the International Commission of Weights and Measures, instituted in 1855, in connection with the Universal Exhibition, contributed by its labours to propagate in Europe the metrical system. Important questions of science, commerce, and finance might also be usefully discussed in similar conferences."

M. Rouher, in conclusion, proposes that that the Exhibition of 1867 should be "more thoroughly universal" than its predecessors, and that to this end it should embrace, as far as possible, the industrial products of all countries, as exemplified in every branch of human activity. He recommends the immediate publication of his report, in order that the most distant nations may make their preparations in time. A Fine Art Exhibition is to take place at the same time as the Industrial Exhibition.

ASSOCIATION FOR THE PREVENTION OF STEAM-BOILER EXPLOSIONS, MANCHESTER.

At the meeting of the Executive Committee of this Association, on Tuesday, April 28th, 1863, James Petrie, Esq., of Rochdale, in the chair, Mr. L. E. Fletcher, chief engineer, presented his Monthly Report, of which the following is an abstract:—

During the past month there have been examined 288 engines and 406 boilers. Of the latter, 6 have been examined specially, 11 internally, 79 thoroughly, and 310 externally; in addition to which, 2 have been tested by hydraulic pressure. The following defects have been found in the boilers examined:—Fracture, 5 (one dangerous); corrosion, 30 (one dangerous); safety-valves out of order, 1; water-gauges, ditto, 8; pressure gauges, ditto, 9; feed apparatus, ditto, 1; blow-out taps, ditto, 32; furnaces out of shape, 4; over-pressure, 4; blistered plates, 4.—Total, 98 (two dangerous). Boilers without glass water-gauges, 6; without blow-out taps, 13; without back pressure-valves, 21.

Some explosions occur at too great a distance from Manchester to admit of a personal investigation, and of these little or no reliable information can be obtained at the time. Of one such which took place last year, and of which the fact of its occurrence only was therefore recorded in the reports, there has since been, through the kindness of the engineer who investigated the explosion immediately after it happened, full information with regard to it, as well as a drawing of the boiler after rupture, both of which are placed at the disposal of the Association. From these it appears that the boiler in question was of plain Cornish construction, and that the explosion resulted from collapse of the internal flue tube.

The explosion was attended with fatal consequences, the rush of steam and water from the flue blowing down the end wall of the boiler-house, abutting against a public thoroughfare, in which the workmen of the establishment, most unfortunately, were assembling around the gates of the premises, a few minutes before bell time. The steam, water, and bricks were all scattered amongst the group, and five lives sacrificed.

The length of the boiler was 26 feet; the diameter of the shell, 7 feet; that of the internal flue, 4 feet; and the thickness of the plates in both, three-eighths nominally, while at the centre of the flue it was found, after the explosion, to have been but little more than one-quarter. The boiler had been purchased second-hand, while the workmanship is reported to have been inferior, and the flue tube, though supposed to be circular, to have proved actually oval at the middle of its length. This flue was not strengthened by flanged seams or hoops, while the working pressure was 50 lbs. to the square inch.

Under these circumstances it is clear that the simple weakness of the flue was the cause of explosion, which must, therefore, be added to the already long list of those which could have been prevented by the simple precaution of strengthening the flue, either with flanged seams or hoops, while the weakness could not have escaped detection on competent inspection, or practical exposure on the application of the hydraulic test.

No. 6 explosion, like the preceding one, occurred at a considerable distance from Manchester, and, although it took place last month, was only reported within the last few days; and there has as yet been no opportunity of obtaining further particulars with regard to it than that the boiler was of plain, cylindrical, egg-ended construction, externally fired, and was thrown by the explosion to a considerable distance from its original seat, which is always the case with this description of boiler.

Neither of the two boilers just referred to were under the inspection of this Association.

Three explosions have occurred during the past month to boilers not under the inspection of the Association, by which nine persons were killed, and four others injured. All of these explosions occurred so far from Manchester that only one of them—viz., No. 8, which was by far the most important—had been personally investigated. The following is the monthly tabular statement:—

Tabular Statement of Explosions from March 28, 1863, to April 24, 1863, inclusive.

Index No.	Date.	General Description of Boiler.	Persons killed.	Persons injured.	Total.
No. 7.	April 7.	Plain cylindrical. Externally fired.........	0	0	0
No. 8.	April 8.	Four cylindrical egg-ended. Externally fired .... One ordinary single flue, or "Cornish." Internally fired...... (These five boilers all exploded simultaneously.)	9	4	13
No. 9.	"	Plain cylindrical. Externally fired.........	0	0	0
Total	....		9	4	13

No. 8 Explosion.—This explosion occurred at an ironworks, and is one of the most remarkable that have come under the notice of this Association—five boilers, working side by side, having in this instance exploded simultaneously, the shells of all of them being rent asunder, and

thrown to a considerable distance from their original brick-work setting, which was completely destroyed, and reduced to a heap of ruins. The fragments and boiler fittings were shot in every direction, many of them falling through the roofs of the adjoining buildings, and one through that of the dwelling-house of the proprietor. Two of the boilers were thrown over a tramway, and landed in a ploughed field beyond; one of them raking the rails in its course, cutting them completely through at the solid metal, and tearing up the roadway, a piece of one of the rails, that had been shorn off, being carried away to a distance with the boiler.

The five boilers were ranged side by side, all of them being connected, both by the steam-pipe and feed-pipe. Their direction was very nearly north and south, the furnaces being at the south end. No. 1 boiler, commencing at the west, was of Cornish construction and internally-fired, while the remaining four were cylindrical, with egg-ends, and externally-fired. The length of all the boilers was about 25 feet, while the diameter was 6 feet in No. 1, and 5 feet in the remaining four, the thickness of the plates being seven-sixteenths in the former, and three-eighths in the latter. The boilers were each fitted with one feed back-pressure valve and feed stop-valve combined, one glass water-gauge, one alarm low-water steam whistle, worked by a float fixed inside the boiler, and one lever safety-valve, of 4 inches diameter, in addition to a Bourdon's pressure-gauge fixed on the steam-pipe at some distance from the boilers. The safety-valve admitted of nearly 60 pounds per square inch, but it was stated that 45 pounds had been the limit at which the boilers had been worked, since the weight had always been placed at some distance from the end of the lever. Even the higher pressure, however, would not have been excessive for boilers of such dimensions, as far as the cylindrical shells are concerned.

The rents were extremely complicated by the effects of the explosion, and although highly important to do so, it is in these cases difficult to determine which are the rents from which the explosion sprung, and which are those that resulted from it; or otherwise, which rents are the primary ones, and which the secondary ones. It appeared, however, that all the egg-ended boilers had rent in two, transversely, one portion flying northward and the other southward, the rent occurring at one of the transverse seams over the furnace, while the larger portion had in every instance flown northwards. In some cases both ends were blown out, and the plates "vandyked" and curled up, the distortion being such as is difficult to describe. These latter effects were due to the flight of the parts and the consequent shock on grounding, and may be considered as secondary, while it is clear, from the direction in which the parts had flown, as well as from the character of the rents themselves, that the primary ones, from which the explosion had sprung, were those at the transverse seams over the furnace.

The Cornish boiler was also rent transversely, at about the middle of its length, both through the shell and flue tube, the end furthest from the furnace being demolished, the shell being opened out, ripped spirally, and the end plate torn off. The other half of the boiler was comparatively uninjured, the whole, though thrown from its original seating, holding together, and the furnace retaining its cylindrical shape.

There is no reason for attributing the explosion either to a deficiency in the number of the fittings, to unwise or excessive pressure, or to shortness of water, but to the weakness of the transverse seams over the furnace,—to which all externally-fired boilers are found to be liable,—aggravated in the present instance by the use of sedimentary water and the mode of introducing it, by which it was injected directly upon the plates at the bottom of the boiler, and immediately over the fire.

There still remains to be explained the fact of the whole series of five boilers having exploded simultaneously.

The percussive force of water, as an important element in producing the destructive effects in steam boiler explosions, has lately excited considerable attention, and is a subject of much interest. The view is as follows:—The temperature of water in a steam-boiler working at 50 pounds pressure, is 300°, which is 88° above the boiling point at atmospheric pressure. On the occurrence of a rent above the water-line, or the rending off of a steam dome, the blowing-off of the man-hole cover, or the fracture of a steam-pipe, &c., the steam above the surface of the water would escape and remove the pressure from it. The 88° of free heat, with which the whole body of water is charged, over and above that necessary for maintaining it at the boiling point at atmospheric pressure, would instantly flash a considerable portion of it into steam, while the globules, not being generated at the surface merely, but throughout the whole mass, would blow up the water with considerable force, converting it into a projectile, having a velocity equal to that due to the pressure. This would give it a destructive force far greater than that of the simple statical pressure of the steam; just as in the injector the stream of water acquires a force of penetration that renders it superior to the pressure of the steam that imparted it, and which enables it to enter a boiler working at a higher pressure than the one supplying the injector. It is thought, by its advocates, that on this principle it is possible that an explosion might happen, without either the existence of any previous weakness of the boiler, the occurrence of any primary rent, or excessive pressure, but simply from the sudden removal of the steam from the surface of the water, when it would be violently projected, as just explained, against the upper part of the shell. It has been proposed to submit this to the test of experiment, and to accomplish the instantaneous clearance of the steam space, either by condensation, effected by the introduction of a jet of cold water, or by the opening of a large valve. Such an investigation would certainly be most interesting and useful, while the result would be highly prized by the engineering world. Of the fact of the sudden liberation of the steam throwing up the water there can be no question, since that is already a matter of experience; whether, however, the entire steam space can be so instantaneously cleared as to allow a sufficient velocity of the water being attained—on the accomplishment of which the force of impact depends—appears to me a matter of question, and I cannot but think that steam would be generated with sufficient rapidity on the surface of the water, to retard the velocity of the mass, as well as to form a cushion which would soften the blow against the shell of the boiler. This is a nice point, and must await the issue of the experiment for determination. I have for some time since, in examining exploded boilers, carefully searched for indications of this action, and it appeared at first that there were manifestations of it in the explosion under consideration. For instance, the feed water had been introduced, as previously stated, at the top of the boiler, the feed stop-valve being bolted to the side of the steam dome, and the water carried by the feed-pipe through the steam space. The failure of this feed-pipe would have allowed the water to play amongst the steam, and thus produce the very condensation desired in the proposed experiment just mentioned; added to which, the steam domes were torn off from the shells, as if by upward impact, and blown in a different direction to the boilers themselves. The feed water, however, proved to have been heated by the exhaust steam from the engine, and thus would have produced but tardy condensation; and even if the flight of one boiler, on the rending of the transverse seams over the furnace had carried away the steam pipe, or rent off the domes of the others, which is highly probable, and thus by suddenly relieving the steam-pressure, set up this percussive action—still, the force of the impact, which must have been upward, can hardly be supposed to have developed the transverse rents previously described, or to have thrown one-half of the boiler to the south and the other

to the north. With a full appreciation of the value of the impact theory, it is not thought that it implies in the present instance, as having produced primary rents, important as it may have been in developing secondary ones, but every opportunity will be taken of watching for its manifestation, and communicating the results to the members.

The cause of the simultaneous explosion is thought to have been as follows:—A single externally-fired egg-ended boiler, say No. 3, rent at one of the traverse seams over the furnace in the first instance. The escape of steam and water from the bottom of the boiler then lifted the remaining ones, and threw them up in the air several feet high, blowing down at the same time the brickwork seating, so that the boilers, on coming again to the ground, fell upon a loose irregular bed, and all became so strained that each rent and exploded in turn. That the percussive action of the steam was sufficient to have done this, is illustrated by the fact, that one of the cast-iron rolls from the mill was lifted by it at the time of the explosion to the height of several feet.

A reference may be of assistance, to a very similar explosion which occurred last year, the particulars being given in the monthly report for March, 1862. In that instance there were four boilers set side by side, and connected together; three of these were egg-ended and externally fired, while the fourth was a Cornish boiler. The three former were at work and all exploded simultaneously, while the latter, not having steam up, escaped, but had evidently been lifted some considerable height by the explosion of the others, and on its fall rent at the bottom of the shell transversely, and the flue tube was also dislocated at its connection with the end plate. The fall had made such serious rents in the shell, that had there been any steam in the boiler at the time, an explosion must inevitably have followed. This, it is thought, affords the key to the explanation of the simultaneous explosion of the five boilers under consideration, and which, it is concluded, was due simply to the fracture of a single externally-fired boiler, at the transverse seams over the fire, in the first instance; and to the effect upon the others, of the percussive action of the steam and water escaping therefrom, in the second.

Explosions No. 7 and No. 9 were very similar in character one to the other. Neither of the exploded boilers having been personally examined, only the following scanty particulars have been obtained:—

No. 7 explosion occurred at a colliery to a cylindrical externally-fired boiler, 36 feet long and 5 feet in diameter. This boiler formed one of a series of five, being the second from the engine-house. It was rent by the explosion into four pieces, while the escape of steam and water blew up the boiler seated next to it, which was the centre one of the series, flattening it on one side, reversing it end for end in position, and rolling it over the other boilers, finally depositing it on the ground beyond. It will be seen that the treatment of this boiler, on the rupture of the one alongside of it, corroborates the view given with regard to the cause of the simultaneous explosion of the five boilers referred to above, and it is hoped that fuller particulars may be obtained.

No. 9 explosion occurred at an ironworks, to a cylindrical externally-fired boiler, about 32 feet long and 5 feet diameter, which was the outer boiler of a series of five.

It will be observed that the seven boilers which have exploded during the month have all been of the egg-ended, externally-fired class, with the solitary exception of the Cornish one, which suffered only through the explosion of the others; and it is trusted that the fact of the constantly recurring failure of these externally-fired boilers will at length dispel the false estimate so generally entertained of their safety. The proprietor of the ironworks at which No. 8 explosion occurred, at once adopted the wisest course, and resolved upon having no more of the externally-fired class upon his works, but laying down "Lancashire" boilers in their place; experience having show him that the plates over a furnace of an internally-fired boiler may fail without moving it off its seat, or causing any loss of life; while with an egg-ended boiler its entire rupture and the flight of the parts, as in No. 7 explosion, is the result.

In another case one of our members, employing several of these externally-fired boilers, has found them to crack at the transverse seams, without warning, for a length of two feet, and consequently determined, as in the previous instance, to condemn them altogether; while to prevent rupture in the meantime, before they can be replaced, contemplates lashing the two ends together with strong longitudinal stays, so as to prevent their flying apart should failure at the transverse seams occur.

THE NEW TOBACCO ACT.

The following are the principal Provisions of the New Act 26 Vic., cap. 7, which came into operation on 28th March:—

Duties Payable on Manufactured Tobacco.

		s.	d.
Segars	per lb.	5	0
Foreign Cavendish or Negrohead. . .	,,	4	6
Snuff, containing more than 13 lbs. of moisture in every 100 lbs. weight thereof . .	,,	3	9
Snuff, not containing more than 13 lbs. of moisture in every 100 lbs. weight thereof.	,,	4	6
Other Manufactured Tobacco	,,	4	0
Cavendish or Negrohead, manufactured in Bond	,,	4	0

Duties Payable on Unmanufactured Tobacco.

		s.	d.
Containing 10 lbs. or more of moisture in every 100 lbs. weight thereof . . .	per lb.	3	0
(With 5 per cent. thereon.)			
Containing less than 10 lbs. of moisture in every 100 lbs. weight thereof . . .	,,	3	6

No tobacco to be examined as to the quantity of moisture contained therein, except by special order of the Commissioners of Customs.

A drawback of 3s. 3d. per lb. to be allowed on tobacco of home manufacture, on the same being by any licensed manufacturer exported or deposited in any bonded warehouse for use as ships stores, provided such tobacco contains 13 per cent. of moisture; a proportionate increase or reduction to be made as the amount of moisture varies below or above that standard. There are further conditions, relating to the quantity of inorganic matter in such tobacco, and no drawback will be allowed on tobacco containing more than 2 per cent. of sand, or 25 per cent. of tobacco stalks.

Cavendish or negrohead tobacco may be manufactured in bond, and materials or ingredients for sweetening or flavouring the same (not being leaves of trees or plants other than the tobacco plant), may be used in such manufacture. Both cavendish and negrohead of British or foreign manufacture on which duty has been, or shall be, paid, may not be delivered for home use, except under specified conditions, namely, made into separate packets, not exceeding one pound, nor less than one ounce each, enclosed in an approved wrapper, fastened by a label provided by the Commissioners of Customs, full duty to be paid thereon before such packets be made; stalks, waste, and other refuse remaining after the manufacture, to be destroyed, or re-warehoused for exportation. The labels to be printed or stamped with such device as the Commissioners of Customs may adopt, and forgery thereof is punishable by imprisonment with hard labour. Any retail dealer in, or vendor of cavendish or negrohead tobacco labelled, as required by the Act, failing on the sale

thereof to obliterate such label before delivery to the purchaser, will be liable to a penalty of £20. Cavendish or negrohead manufactured in bond, not packed according to the above conditions, to be re-warehoused for exportation, or for future packing.

Foreign cavendish or negrohead tobacco containing leaves of trees or plants other than the tobacco plant to be forfeited, and the importation of manufactured tobacco other than cavendish or negrohead, adulterated with any ingredient whatever, is prohibited under a penalty of £100. Any manufacturer of or dealer in tobacco who, at the time of the passing of the Act, shall be in possession of any duty-paid foreign cavendish or negrohead tobacco, to have the same packed and labelled according to the above conditions within 28 days, under a penalty of £20.

The Commissioners of Customs to make such rules from time to time as shall appear to them necessary for the due observance of the conditions required by the Act.

PAPER MATERIAL.

In searching for fibre suited for the manufacture of paper, the following hints may be found useful to residents in tropical and other regions.

Any fibre capable of cohesion when precipitated on a draining surface from mechanical suspension in water, after having been reduced to a pure state of capillary subdivision by mechanical action, is fit for the manufacture of paper.

For all practical purposes it may be accepted as a rule, that for the manufacture of white paper all fibres require bleaching.

Raw fibre may be divided into four classes :—

1. That which is easily reduced and easily bleached.
2. That which is easily reduced, but difficult to bleach.
3. That which is difficult to reduce, but easily bleached.
4. That wherein perfect bleaching involves the integrity of the fibre.

The most profitable shape in which to send fibre to the English market is that of half-stuff (or pulp). Well prepared bleached half-stuff would fetch £25 per ton in the market.

The best machine for reducing fibre to half-stuff is the ordinary rag-engine, costing about £150, carrying about 2 cwt. of stuff, and requiring a maximum of seven-horse power for driving. The half stuff would require to be pressed, dried, and packed in bales. For experimental purposes in reducing the fibre, anything smaller than the ordinary sized rag engine is useless, as the weight of the triturating roll—about 15 cwt.—cannot be dispensed with, so that laboratory experiments are necessarily confined to rough separation and bleaching. Moreover, laboratory experiments, unless conducted with the utmost care and skill, furnish no reliable data for commercial operations. As a preliminary, the character of the fibre ought to be determined in the laboratory :—

1st. In relation to its structure, having in view ease in fibrous separation.

2nd. In relation to its chemical construction, having in view ease in bleaching.

Bleached half-stuff would realise a larger profit than unbleached, always supposing that the process of bleaching, owing to the accident of geographical position or otherwise, did not entail expenses extra to that properly belonging to the operation under the most favourable circumstances.

Fibre could be sent into the market as half-stuff unbleached whenever its characteristics were reliably established.

EXAMINATION PAPERS, 1863.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last :—

ARITHMETIC.

THREE HOURS ALLOWED.

(No marks will be allowed for answers where the working is not shown.)

1. Find by practice the cost of 3960$\frac{11}{12}$ articles at 4s. 6$\frac{1}{2}$d. each.

2. What is the rent of 225 acres 1 rood 19 poles at 13s. 2$\frac{1}{2}$d. per rood?

3. If a railway fare for 77 miles be 22s. what will be the expense of travelling 364 miles, and what the rate per mile?

4. What part of 35s. is $\frac{5}{12}$ths of 24s.?

5. Find the value of $\frac{7}{9}$ths of $\frac{9}{14}$ths of $\frac{3}{5}$ths of £3 4s. 6d.

6. If the carriage of 17 cwt. 3 qrs. for 7$\frac{1}{2}$ miles cost 20s. 8$\frac{1}{2}$d., what weight should be carried 20 miles for 16s. 4d.? Work by decimals.

7. Find the difference between 6$\frac{1}{2}$ guineas and £3·525, and reduce it to the decimal of a crown.

8. Divide £8 3fl. 7c. among four persons: giving the first 1$\frac{1}{2}$ as much as the second; the second 1$\frac{1}{4}$ as much as as the third; and the third 1$\frac{1}{6}$ as much as the fourth.

9. A poor rate of £530 is to be levied from three parishes, the population being respectively 2,500, 3,000, 4,200. How much should each parish pay, and how much each person?

10. If I spend in 6 months as much as I earn in 4 months, how much shall I have saved at the end of a year if my earnings every 6 months are £183 17s. 6d.?

11. If sugar be sold at the rate of 5d. per lb., how much should it be bought at per cwt. to gain 25 per cent.?

12. For what sum should a ship worth £3,000 be insured at 3 per cent. in order to cover its value and the premium?

13. During the first 6 months of the year the income-tax is at the rate of 7d. in the £; but during the last 6 months it is at the rate of 5d. in the £. If a person's income, after deducting the tax, be £819, what is his gross annual income?

14. A person has £3,400 of 3 per cent. stock. He sells out at 77$\frac{1}{8}$ and buys 5 per cent. stock at 106. How is his income affected?

15. How many bricks will be required to build a wall 8 feet high, 1 foot 8 inches thick, and 5 poles in length; the dimensions of a brick being 10 inches long, 4 inches broad, and 2$\frac{1}{2}$ inches thick?

16. A watch which is 5 minutes slow at noon on Monday gains 3 minutes 20 seconds daily; what will be the true time when it points to 6 o'clock on the following Saturday evening?

17. If a person has to pay £120 in 8 equal monthly instalments, when may he equitably pay it all at once?

18. A quantity of railway stock is sold at 108 and the proceeds invested in the 3 per cents. at 91$\frac{1}{8}$; the 3 per cent. stock is then sold at 95$\frac{3}{8}$, and the original stock is repurchased at 109. The profit on the entire transaction is £109. Find the amount of railway stock.

19. The alloy in English silver is $\frac{3}{40}$ths of the whole, and in French silver $\frac{1}{10}$ of the whole, and the par of exchange between the two countries is 25 francs 22 cents., the weight of a franc being 77·16 grains. Find the price of English standard silver per ounce.

20. A. and B. can do a piece of work in 30 and 36 days respectively. They work together for 6 days, when B. leaves, but A. goes on, and after 6 days is joined by C., and then they finish the work together in 8 days. In how many days could C. alone have done the work?

BOOK-KEEPING BY DOUBLE ENTRY.

THREE HOURS ALLOWED.

1. In what consists the distinction between the double entry and the singly entry method?
2. Does double entry secure the detection of all errors to which a book-keeper is liable?

Note.—**Reasons to be stated for the answer given to this question.**

3. What are the respective uses of the Journal and Ledger?
4. Can books be kept by double entry without a Journal?
5. What should a profit and loss account and a balance sheet severally exhibit?
6. Journalise and post in due technical form and language the following supposititious transactions, and make out from the Ledger—a trial balance, a profit and loss account, and a balance sheet.

On the 1st January, 1863, John Hodge and Charles Wright found the state of their partnership affairs to be as follows:—

Liabilities.

Due to John Hodge, Capital	£2,000	0	0
,, Charles Wright, Capital	1,000	0	0
,, John Roe	450	0	0
The Firm's acceptance due 30th January	820	0	0
	£4,270	0	0

Assets.

Cash at the Bankers	£1,250	0	0
Petty Cash in hand	5	15	0
Due from James Pott	164	5	0
,, Henry Nix	50	0	0
Bill Receivable due 15th February	400	0	0
Stock of Wine, 50 pipes	2,400	0	0
	£4,270	0	0

The Capital of the Partners bears interest at £5 per cent. per annum, and the net profits are divisible between the two partners in equal moieties.

Transactions.

1863.				
Jan. 1.	Sold 10 pipes of wine to Henry Green	£550	0	0
,,	Bought 20 pipes of Wine of Charles Brown	800	0	0
9.	Received Cash from O. G. & Co. proceeds of Bill receivable for £400 due 15th Feb. discounted with them	397	15	0
,,	Discount charged by O. G. & Co.	2	5	0
12.	Paid Cash to Charles Brown	760	0	0
,,	Trade discount allowed by Charles Brown	40	0	0
15.	Received Cash from James Pott on account	100	0	0
20.	Sold James Pott 2 pipes of Wine	140	0	0
25.	Received of Henry Green his acceptance at 2 months, due 28th March	550	0	0
30.	Accepted John Roe's draft at 4 months' date	450	0	0
,,	Cash paid our acceptance due this day	820	0	0
31.	Cash paid Clerk's salary 1 month	15	0	0
,,	Paid out of Petty Cash sundry trade charges	1	16	0
,,	Paid out of Petty Cash on private acct. of J. Hodge	3	0	0
Feb. 1.	Advanced to Petty Cash	10	0	0
,,	Cash drawn out by the partners on their respective private accounts, viz.:— John Hodge 60 0 0; Charles Wright 50 0 0	110	0	0
2.	Sold to Richard Love 20 pipes of Wine at £50	1,000	0	0
,,	Consigned to Sydney on our own account and risk, through Small & Co., 10 pipes of Wine invoiced at	600	0	0
10.	Received of Small & Co. Cash as advance on consignment to Sydney	330	0	0
15.	Bill receivable due this day returned dishonoured by acceptor, J. Nokes	400	0	0
,,	Notarial charges thereon paid out of Petty Cash	0	3	6
20.	Cash received of John Nokes on account of his dishonoured acceptance	200	0	0
21.	Purchased of Henry Jones 15 pipes of Wine	750	0	0
,,	Sold to H. Cox 5 pipes of Wine	450	0	0
,,	Cash paid, Freight, Insurance, and charges on consignment to Sydney	75	0	0
23.	Received of H. Cox, Cash	200	0	0
	His acceptance due 26th May	100	0	0
24.	Received of Richard Love his acceptance due 27th of April	600	0	0
28.	Value of Stock of Wine remaining on hand at this date	1,700	0	0
,,	Due to H. Good for stationery	7	10	0
,,	,, H. Knott, one month's salary	15	0	0
,,	,, J. Craig, two months' rent	20	0	0
,,	Credit partners' accounts with 2 months' interest on their Capital, viz.:—			
	John Hodge on £2,000	16	13	4
	Charles Wright on £1,000	8	6	8
,,	Debit partners' accounts with interest on sums drawn on private Account, viz.:—			
	John Hodge 1 month on £60	0	5	0
	C. Wright 1 month on £50	0	4	2
,,	Credit John Hodge his moiety of balance of Profit and Loss account			
,,	Credit Charles Wright do. do.			

ALGEBRA.

THREE HOURS ALLOWED.

(A.)

1. State and account for the rules of signs in Algebraical Multiplication.
2. Find the value of the combined product of the factors $x+1$, x^2+1, x^4+1, x^8+1, and the product of this again by $x-1$.
3. Find the greatest common measure of 484 and 693, and then prove from your process,
   1st, That the number so determined is a common measure; and
   2nd, That it is contained in every other common measure of the two given numbers.
4. Reduce the quantity—

$$\left(\frac{a+b}{c+d}+\frac{a-b}{c-d}\right) \div \left(\frac{a+b}{c-d}+\frac{a-b}{c+d}\right)$$

to its simplest form.

5. If $a : b :: c : d$, prove that—

$$\frac{m a + n b}{a + q b} p = \frac{m c + n d}{p c + q d}$$

6. A boating crew, who can pull eight miles an hour in still water, find that it takes them two-thirds more time to go up a river than to go down it. Find the rate at which the river flows.
7. Find x, y, z from the equations—

$$\frac{x}{a}+\frac{y}{b}=1;\ \frac{x}{a}+\frac{z}{c}=1;\ \frac{y}{b}+\frac{z}{c}=1.$$

8. Solve the equation—

$$\frac{x}{x+1} + \frac{x+1}{x} = 2\frac{9}{10}$$

And also the equation—

$$\sqrt{x+a} - \sqrt{x} = \sqrt{x+b}$$

B.

9. Find the third term and the sum of the geometrical series of which

$$\frac{\sqrt{2}+1}{\sqrt{2}-1} \text{ and } \frac{1}{2-\sqrt{2}} \text{ are the first two terms.}$$

10. In how many different ways can 9 people arrange themselves in a ring, with one of them in the centre?

11. Calculate the cube root of 999 to at least eight places of decimals by the Binomial theorem.

12. Solve the equations:—

$$x^2 - xy = 10$$
$$xy + 2y^2 = 33.$$

*13. If $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{1}{a+b+c}$

Prove that $\frac{1}{a^3} + \frac{1}{b^3} + \frac{1}{c^3} = \frac{1}{(a+b+c)^3}$.

(To be continued.)

Home Correspondence.

DECIMALISING WEIGHTS AND MEASURES.

Sir,—When writing on this subject in the last *Journal*, I referred to "Brande's Chemistry" for my data, a book which contains some very convenient, but, as I have before discovered, misleading tables.

Although he refers to the Imperial gallon, I find (on reconsidering the subject) in the table comparing the metrical and English measures, he retains the old measure, in which the pint is only 16 ounces. The litre contains more than two such pints, but only about $1\frac{3}{4}$ pints of the Imperial measure.

The printer has also put "thilolitre" for "kilolitre."

I am, &c., W. SYMONS.

17, St Mark's-crescent, Regent's-park.

Proceedings of Institutions.

Hackney Working Men's Institute.—The fifth annual report says that though the year now closed has not proved so prosperous as its predecessor, yet, it has not been the most depressing year in the history of the Institution, for the aim and object of the committee have been sufficiently fulfilled to warrant its perpetuity. The number of members enrolled during the year was three hundred and thirty-nine. This is a decline of fifty from the previous year, but thirty-eight in excess of the year before that. The average number of members for each month during the year is eighty-seven. The attendance during the winter months, in comparison with the summer, is four to one. These members, almost without exception, are of the class which gives its name to the Institute. There have been 31 lectures, three tea-meetings, and three concerts held during the year. The attendance on these has, upon the whole, been satisfactory. Of the 339 members, a very considerable portion stood in need of elementary instruction in the ordinary branches of education. Some of them had had but few educational advantages during their youth, while others, to use an expression of their own, had been "knocking about half their lives," and forgotten the little they formerly knew. The wants of these persons have been met. The reading class was in operation from September until Easter; the attention given and the progress made by the pupils were gratifying to the gentleman who conducted it. To two young men he presented handsome copies of the "Pilgrim's Progress," a book they are enabled to read through attending this class. The writing and arithmetic classes were conducted twice a week during the same period, with results satisfactory to the gentleman who taught them. A grammar class was also conducted during the latter part of the winter. The singing classes are in perpetual operation, summer as well as winter. The conductor of the singing classes (on the tonic-sol-fa method) is Mr. H. George, whose services, given gratuitously, have been in constant request by the Institute for the past five years. The committee gratefully record the obligation they are under to those gentlemen who have so kindly aided by conducting classes and the delivery of lectures. The library forms an important part of the machinery of the Institute, though from what has been said of the need for elementary instruction, it will be seen that all members cannot avail themselves of it. The number of persons who have taken books from the library is 147. The number of times books have been lent is 878, giving an average of about six books to each reader. The books in the library number only 390. This department needs considerable improvement. The reading-room, supplied with numerous papers and periodicals, is a favourite resort. To non-members a charge of one penny is made for a single admission. Chess and draughts have had their share of attention from the members. The Bible-class, conducted by the secretary, continued through the winter, and has again commenced this autumn, on Thursday evenings, with an encouraging attendance. A mothers' meeting is still held on Monday afternoons, concerning which the lady secretary thus writes: "The attendance at the mothers' meeting is on the increase. During the first six months of the year, there were only five or six usually present, but since that time the numbers have risen to 12. There are now 28 names on the books. The ladies conducting the meeting are thankful to observe that their labour is not lost, and that they excite a beneficial influence on the minds and habits of those with whom they are thus associated." During the year the amount deposited in the penny bank was £177 19s. 3d., the withdrawals amount to £172 4s. 4d. The number of depositors was 643, and of deposits 4,318. Average amount deposited by each person 5s. $6\frac{1}{4}$d.; of deposits by each $6\frac{1}{2}$d. Average amount of each deposit $9\frac{3}{4}$d. It was thought that the opening of the post-office banks would to a certain extent supersede the penny bank, but such is not the case, for the amount deposited and the number of depositors are both larger than those of the previous year. The bank has proved a boon to many, by providing a resource for an emergency; and though the sums deposited are small, yet to those whose incomes are not only small but precarious, they have often proved sufficiently large for their purpose. The terms entitling to the advantages of this Institute, must be necessarily low, in order to keep them within reach of the class for which the Institute is intended. Sixpence per month is all that can be charged; this entitles to all its benefits. The expenditure has been £126 15s. 11d., and there is a balance of £10 9s. 9d. due to the treasurer.

PARLAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 12th June, 1863.

299. Royal Engineers—Return.
315. Highways—Return.
320. Carlton House Terrace—Return.
327. East India (Burmah)—Copy of a Treaty.
153. Bills—Execution of Decrees (amended).
157. ,, Innkeepers' Liability (No. 1) (amended).

Delivered on the 13th and 15th June, 1863.

332. Army (Soldiers' Institutes)—Return.

334. Maclachlan Case—Return.
340. English Services in Wales—Return.
343. Lisburn Election—Minutes of Evidence.
296. Greenwich Hospital—Return.
309. Public Accounts—Second Report from Committee.
346. Cheshire, Lancashire, and Derby Unions—Return.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June* 19*th*, 1863.]

Dated 11*th June*, 1863.

1450. T. M. Harrison, Birmingham—An imp. or imps. in the manufacture of metallic casks.

1452. J. F. Kain, Fleur-de-lis street, Norton Folgate—Imp. in umbrellas, parasols, sunshades, walking sticks and whips, and in brooches and other ornaments.

1456. J. Webster, Birmingham—Imp. in indurating iron, and in protecting iron and steel from oxidation.

1460. E. O. Hallett, Weymouth and Melcombe Regis—Imp. in constructing the sides of ships, batteries, and fortifications, and in applying armour plates thereto.

1462. J. Johnson and W. Braithwaite, Peterborough—Imp. in reversing levers for locomotive engines and others.

[*From Gazette, June* 26*th*, 1863.]

Dated 18*th February*, 1863.

448. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of boots and shoes, and in preparing india-rubber for such and other uses. (A com.)

Dated 5*th March*, 1863.

626. T. W. Osborne, Aston New Town, Warwickshire—Certain imp. in lamps.

Dated 11*th March*, 1863.

659. H. Fletcher, Manchester—Imp. in cleaning and preparing cotton for spinning.

Dated 22*nd April*, 1863.

1002. H. B. Barlow, Manchester—Imp. in shoes, boots, and other coverings for the feet. (A com.)

Dated 14*th May*, 1863.

1216. L. S. Chichester, Brooklyn, U.S.—Imp. in machinery for weighing grain.

Dated 25*th May*, 1863.

1315. J. Hilliar, Cheapside—Imp. in the construction of the frames, sashes, shutters, blinds, and ventilators for windows or other openings, parts of which improvements are also applicable to other constructive purposes.

Dated 26*th May*, 1863.

1326. F. W. Kitson and J. Kitson, jun., Leeds—Imp. in the manufacture of the tyres for railway wheels, and in the means of securing the tyres to the wheels.

Dated 4*th June*, 1863.

1396. H. Pollack, Hamburg—An imp. in the manufacture of scarlet, brown, and orange colours.

Dated 5*th June*, 1863.

1404. J. Seaman, Worcester—Imp. in implements to be used in the cultivation of the soil.

Dated 8*th June*, 1863.

1408. R. Wallis, Basingstoke—Imp. in apparatus for loading and unloading vessels, and for elevating and otherwise conveying sacks, casks, and other packages, parcels, or objects from one locality to another.

1414. W. Miller, 70, Upper Stamford-street, Blackfriars—An improved mode of constructing ships, vessels, or boats, and of apportioning their freight to that construction, so as to prevent their sinking or being destroyed by fire.

Dated 11*th June*, 1863.

1448. M. Hatschek, 32, Lower Belgrave-place—An improved method of mashing.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1536. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in machinery for the manufacture of bolts and rivets. (A com.)—19th June, 1863.

PATENTS SEALED.

[*From Gazette, June* 23*rd*, 1863.]

June 23*rd*.
3459. J. Petrie.
3460. M. Ker.
3461. J. G. Taylor.
3465. F. Tolhausen.
3476. W. Mould.
3482. W. B. Adams.
10. W. Robinson.
26. S. White.
28. C. B. Clough.
60. G. A. Huddart.
73. W. H. Tucker.
94. E. Stevens.
111. L. Lescuyer.
120. G. A. Biddell.
122. J. Lawson.
125. T. Wilkinson.
153. J. Combe.
167. J. Mosheimer.
213. C. Turner.
227. J. B. Fell.
246. W. E. Gedge.
325. W. Betts.
331. B. F. Bates.
930. R. Newton.
994. W. E. Newton.

[*From Gazette, June* 26*th*, 1863.]

June 26*th*.
3474. F. B. Anderson.
3475. W. Bowser and H. Bowser.
3485. J. W. P. Field.
1. R. H. Collyer.
4. M. E. Bowra and A. E. Francis.
7. J. J. Southgate.
9. W. Soutter.
16. A. Bamford, R. Blomley, R. Taylor, and J. Lett.
173. W. Clark.
347. C. Parigot and A. Grivel.

[*From Gazette, June* 30*th*, 1863.]

June 30*th*.
12. W. A. Distin.
19. H. J. Sergeant.
21. R. C. Ransome.
22. A. S. Bolton.
25. W. Philippi.
27. W. Astrop.
31. E. B. Keeling.
34. J. Howard and J. Bullough.
42. C. T. Jedkins.
43. J. Eckersley.
44. J. Leigh.
47. M. Hodgart.
50. G. Turner.
51. J. Whitworth and W. W. Hulse.
59. G. C. Grimes.
62. G. Dowler.
88. M. Vogl.
90. F. Fenton.
97. W. Clark.
126. W. Johnson.
142. D. F. Leblanc.
156. W. E. Newton.
171. H. A. Bonneville.
183. J. Holt.
193. H. Holcroft.
535. H. Edmonds.
558. W. Gray.
875. J. Macintyre.
914. H. Caudwell.
1025. W. A. Shaw.
1140. P. Bourne.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, June* 23*rd*, 1863.]

June 15*th*.
1466. M. Myers, M. Myers, and W. Hill.
1468. W. Dray and R. Gardiner.
1470. E. Deane and W. D. Marsh.
1475. E. Stone.
1478. H. Nicholson.
June 16*th*.
1500. F. Preston.
June 17*th*.
1476. T. Kershaw.
1492. G. Hinton.
1507. W. Baker.
1527. J. Ramsbottom.
June 19*th*.
1499. R. Bodmer.
1532. H. Jones.
1543. W. Routledge.
1546. W. Hooper.
1837. J. Hamilton, jun.
June 20*th*.
1516. H. Palmer and H. S. Swift.
1521. W. Macfarlane.

[*From Gazette, June* 30*th*, 1863.]

June 23*rd*.
1553. H. Cartwright.
1556. W. E. Newton.
June 25*th*.
1560. J. Macintosh.
June 26*th*.
1566. J. Blakeley and W. H. Blakeley.
1894. J. Lancelott.
June 27*th*.
1580. G. C. Morgan.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, June* 23*rd*, 1863.]

June 17*th*.
1437. M. A. Muir & J. McIlwham.
1441. G. Tillett.
1453. J. Bullough.
1471. G. Riley.

[*From Gazette, June* 30*th*, 1863.]

June 22*nd*.
1479. J. Saxby.
June 23*rd*.
1810. W. E. Newton.
June 27*th*.
1623. A. W. Williamson.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4568	June 20.	Improved Turn Wrest Plough	William Harris Treffey	Tregonhaine, near Tregony, Cornwall.
4569	,, 26.	Improved Kitchener	George Wright and Co.	Burton Weir, Rotherham.

Journal of the Society of Arts.

FRIDAY, JULY 10, 1863.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The Council hereby convene a General Meeting of the Members of this Society, to be held on Friday the 17th of July, at 4 o'clock p.m., to receive a report from the Council in reference to the intended Memorial of the Prince Consort for the Society.

By order of the Council,
P. LE NEVE FOSTER,
Secretary.

9th July, 1863.

WOOD-CARVING EXHIBITION.

This Exhibition will close to-morrow, the 11th July. Exhibitors are requested to arrange for the removal of their works on Monday next.

EXAMINATIONS, 1863.

The papers of questions set at the Society's Final Examinations in May last, are now published, and may be had of the Society's publishers, Messrs. Bell and Daldy, Fleet-street, price 6d.

PRIZES TO ART-WORKMEN FOR ART-WORKMANSHIP.

The following notice has been issued by order of the Council* :—

I. The Council of the Society of Arts hereby offer prizes to Art-workmen for the successful rendering of the undermentioned designs in the undermentioned processes of manufacture, according to the directions detailed in each case.

II. Such designs will be by artists of great reputation, to be translated into the various modes of workmanship, and photographs and castings of such designs will be sold by the Society. at the Society's House, at cost price, to persons desiring to be competitors.

III. The works to be executed will be considered to be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

IV. The exhibitors are required to state in each case the prices at which their works may be sold, or if sold previously to exhibition, at what price they would be willing to produce a copy.

V. The awards in each class will be of two grades, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the award; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

VI. The prizes will be presented publicly. Before the award is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

* Copies may be had on application to the *Secretary*.

1. Modelling in Terra Cotta, Plaster, or Wax.

(*a.*) *The Human Figure in bas-relief.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's design of the "Three Graces."* Dimensions—The figures are to be 9 inches high.

[Photograph—One shilling.]

(*b.*) *Ornament in bas-relief.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas van Leyden, 1528. Dimensions, 12 inches by 6 inches.

[Photograph—Sixpence.]

2. Repoussé Work in any Metal.

(*a.*) *The Human Figure as a bas-relief.*—A prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's "Three Graces."* Dimensions—The figures are to be four inches.

[Photograph—One shilling.]

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a Flemish salver in the South Kensington Museum, date about 1670, No. 1153. Dimensions—Diameter, 10 inches.

[Photograph—One shilling.]

3. Hammered Work, in Iron, Brass, or Copper.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after an iron German arabesque, about 1520, in the South Kensington Museum, No. 2450. Dimensions—12 inches by 1½ inch.

[Photograph—One shilling and threepence.]

4. Carving in Ivory.

The Human Figure in bas relief.—One prize of £10 for the best and a second prize of £5 for the next best, work executed after a Terra Cotta ascribed to Luca della Robbia, about 1420, in the South Kensington Museum, No. 7610. Dimensions—The plaque to be four inches high.

[Photograph—One shilling.]

5. Chasing in Metal.

(*a.*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after a reduced copy of *Gibson's "Psyche."*

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society, price, 12s. A plaster cast may be obtained from D. Brucciani, 39, Russell-street, Covent-garden, W.C., price, 3s. 6d.

(*b.*) *Ornament.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a bronze plaque in the South Kensington Museum, No. 1217.

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society, price 1s.

6. Enamel Painting on Metal, Copper, or Gold.

(*a.*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's design of the "Three Graces,"* executed in *grisaille.* Dimensions—The figures are to be four inches high.

[Photograph—One shilling.]

(*b.*) *Ornament in grisaille.*—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a German arabesque (16th century). Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

7. Painting on Porcelain.

(*a*) *The Human Figure.*—One prize of £10 for the best and a second prize of £5 for the next best, work executed after *Rafaelle's* " *Boy bearing Doves*," in the cartoon of the "*Beautiful Gate.*" Dimensions, the same as the Photograph. This work is to be coloured according to the taste of the painter.

[Photograph—Ninepence.]

(*b.*) *Ornament.*—One prize of £5 for the best and a econd prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, 1528, and coloured according to the taste of the painter. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

8. Inlays in Wood (Marquetry, or Buhl), Ivory or Metal.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a majolica plate in the South Kensington Museum, 1490, No. 1671. Dimensions—The same as the Photograph.

[Photograph,—One shilling and threepence.]

9. Engraving on Glass.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, 1528, engraved the height of the photograph; and if round a glass or goblet, repeated so as to be not less than 9 inches long when stretched out.

[Photograph—Sixpence.]

10. Embroidery.

Ornament.—One prize of £5 for the best and a second prize of £3 for the next best, work executed after a German example in the Green Vaults at Dresden. Dimensions, according to the taste of the embroiderer.

[Photograph—Sixpence.]

The Council cannot hold itself responsible for any accidents or damages of any kind, occurring at any time.

Each work must be marked with the name of the Art-workman, or, if preferred, with a cypher, accompanied by a sealed envelope, giving the name and address of the Art-workman, and delivered free of all charges, at the Society of Arts House, John-street, Adelphi, London, W.C., on or before the 31st August, 1863.

The Council desire to remind those who propose to be competitors, that they should make known their intention before the 15th of July, and as much earlier as possible. This information is necessary to enable the Council to make suitable arrangements for the distribution of the awards.

CENTRAL COMMITTEE OF EDUCATIONAL UNIONS.

Examinations, March, 1863.

The following is a list of the Candidates who obtained Certificates in the Elementary Examinations held in March last:—

ALDERSHOT AND FARNHAM DISTRICT LOCAL BOARD.

Senior Candidates.

Number of Candidates examined ... ... 2 | Number of Candidates passed 2

NAME OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	Subjects in which the Candidate has Passed.				
			Arithmetic.	St. Mark and Acts.	English History.	Geography.	
Henry Kearns...	Aldershot	16	—	—	—	—	
Christopher Pritchard ...	Aldershot	17	—		—	—	

Junior Candidates.

Number of Candidates examined ... ... 3 | Number of Candidates passed 3

NAME OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	Subjects in which the Candidate has Passed.				
			Arithmetic.	Gospel History.	English History.	Geography.	
Samuel Kearns	Aldershot	14	—	—	—	—	
Isaac Boulger...	Aldershot	15	—	—	—	—	
Andrew Phillips	Aldershot	13	—	—	—	—	

HERTFORD LOCAL BOARD.

SENIOR CANDIDATE.

Number of Candidates Examined ... ... 1 | Number of Candidates Passed... 1

NAME OF CANDIDATE.	PARISH OR INSTITUTION.	AGE.	Subjects in which each Candidate has passed.		
			Arithmetic.	St. Mark's Gospel & Acts of the Apostles.	Geography.
J. Graves	Hertford	14	—	—	—

JUNIOR CANDIDATES.

Number of Candidates Examined ... ... 6 | Number of Candidates Passed... 3

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	Subjects in which each Candidate has passed.		
			Arithmetic.	Gospel History.	Geography.
George Trott	Hertford	12	—	—	—
J. Fisher...	Hertford	13	—	—	—
J. Lamb	Hertford	14	—	—	—

MACCLESFIELD USEFUL KNOWLEDGE SOCIETY.

JUNIOR CANDIDATES.

Number of Candidates Examined ... ... 11 | Number of Candidates Passed... 3

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	Subjects in which each Candidate has passed.			
			Arithmetic.	Gospel History.	English History.	Geography.
Charles Booth	Macclesfield	...	—		—	—
James Hepplestone ...	Macclesfield	...	—		—	—
Joseph Burgess	Macclesfield	...	—		—	—

METROPOLITAN ASSOCIATION FOR PROMOTING THE EDUCATION OF ADULTS.—FIVE CENTRES.*

Number of Candidates Examined ... ... 225 | Number of Candidates Passed 88

1.—HACKNEY LOCAL BOARD.

PRIZES.

SENIOR.—1st Prize, Books to the value of £1 0s.
2nd Prize ,, ,, 15s.†
JUNIOR.—1st Prize ,, ,, 10s.
2nd Prize ,, ,, 5s.†

NAMES OF SUCCESSFUL CANDIDATES.	OCCUPATION.	Age.	Arithmetic.	Geography.	English History.	Gospel History, &c.	Needlework.	PRIZES.
SENIOR.								
W. H. Gill	Clerk	22	—	—		—		1st Prize, £1.
Arthur Gibson	,, ...	34	—	—		—		
Thos. Porter	Pupil Teacher	17	—	—	—			
JUNIOR.								
William Stockbridge ...	Clerk	18	—	—	—			1st Prize, 10s.
W. G. Robinson... ...	Builder	18	—	—	—			
J. M. Moore	Wood Engraver ...	16	—	—	—			
C. R. Gray	Shop-boy	12	—	—	—	—		
Jesse Sparrow	Office-boy	14	—	—		—		
George Cleverley ...	Gas Worker	20	—	—	—			

* All the Prizes are local. † Not awarded.

2.—LAMBETH LOCAL BOARD.

PRIZES.

1st Prize—For highest aggregate marks	10s.
2nd Prize—For next highest	7s.
Four Prizes—For highest marks in each subject	5s.
Two Special Prizes—For highest marks gained by Men	10s. and 7s.

NAMES OF SUCCESSFUL CANDIDATES.	OCCUPATION.	Age.	Arithmetic.	Geography.	English History.	Gospel History.	Needlework.	PRIZES.
Baker, Alfred	School-boy	15	—	—	—	—		1st Prize, 10s.
Wood, Henry	News-boy	13	—	—	—	—		2nd ,, 7s.
Shead, Edwin	Messenger	15	—	—	—	—		Scripture, 5s.
Tidmarsh, John	Pupil Teacher	15	—	—	—	—		
Fyson, George	School-boy	13	—	—	—	—		
Fairhall, George	Office-boy	13	—	—	—	—		
Turner, Albert	Junior Clerk	22	—	—	—	—		1st Men's Special, 10s.
Watley, Robert	School-boy	13	—	—	—	—		
Brightwell, H.	Office-boy	14	—	—	—	—		History, 5s.
Baskerville, Jos.	Brass-finisher's Apprent.	14	—	—	—	—		
Wootten, J.	Office-boy	15	—	—	—	—		
Rendell, Samuel	Junior Clerk	16	—	—	—			2nd Men's Special, 7s. 6d.
Eastop, Wm.	Painter's Apprentice	14	—	—	—			Arithmetic, 5s.
Callaway, Ed.	School-boy	13	—	—	—	—		
Hayter, John	Messenger	15	—	—	—			
Hill, William	Office-boy	14	—	—	—			
Barton, Ch.	School-boy	13	—	—	—			Geography, 5s.
Raymond, James	Junior Clerk	20	—	—	—	—		
Lipscombe, W.	School-boy	12	—	—	—	—		
Walker, C.	Junior Clerk	18	—	—	—			
Gray, Edwin	Clerk	22	—	—	—			
Kings, Staples	Plasterer	18	—	—	—			
Knox, Emily	Monitor	15	—	—	—	—		
Baker, Fred.	School-boy	13	—	—	—	—		
Beech, J. S.	School-boy	12	—	—		—		
Pepper, Wm.	School-boy	12	—	—	—			
Battman, Jas.	Messenger	14	—	—	—			
Burnham, J.	Printer's Apprentice	14	—	—	—	—		
Stubbs, Walter	Apprentice	13	—	—		—		
Tate, George	School-boy	15	—	—		—		
Brady, Frank	Carpenter	16	—	—	—			
Robinson, Frederick	Office-boy	15	—	—	—			
Dawes, Thomas	School-boy	13	—	—	—			
Carver, Wm.	Monitor	14	—	—		—		
Woodman, H.	School-boy	13	—	—		—		
Try, William	School-boy	13	—	—		—		
Blincko, Hercules	Apprentice	14	—	—		—		
Heaps, E. J.	Joiner	20	—	—	—			
Langler, John	Engineer	22	—	—	—			
Baxter, Sarah	School-girl	14	—		—	—		

3.—SOUTHWARK LOCAL BOARD.

NAMES OF SUCCESSFUL CANDIDATES.	OCCUPATION.	Age.	Arithmetic.	Geography.	English History.	Gospel History.	Needlework.	
JUNIOR.								
A. R. Burt	Mechanic	16	—		—	—		
William Lloyd	,,	17	—	—	—	—		
James White	Cabinet-maker	18	—	—	—			
Elizabeth Dynes	Pupil-teacher	16	—	—	—			

4.—St. James, Westminster, Local Board.

PRIZES.

Special Prize, £2 2 0

Senior—1st Male Prize	£1 1 0	Junior—1st Male Prize	10s. 6d.
Female Prize ...	1 1 0	Female Prize ...	10s. 6d.
2nd Male Prize ...	0 10 6	2nd Male Prize	5s. 0d.
Female Prize ...	0 10 6	Female Prize ...	5s. 0d.

NAMES OF SUCCESSFUL CANDIDATES.	OCCUPATION.	Age.	Arithmetic.	Geography.	English History.	Gospel History.	Needlework.	PRIZES.
Senior.								
George F. Trepte ...	Pupil Teacher	17	—	—	—	—		Special Prize, £2 2s.
James Philip Wills ...	Clerk	19	—	—	—	—		1st Male Prize, £1 1s.
George Wright	Pupil Teacher	17	—	—	—	—		2nd Male Prize, 10s. 6d.
Henry S. Loop	,, ...	18	—	—	—	—		
Edward Flood	,, ...	18	—	—	—	—		
William Richardson ...	,, ...	17	—	—	—	—		
Mary Jane Reed ...	,, ...	19	—	—	—	—	—	2nd Female Prize, 10s. 6d.
Hurbert Stone	,, ...	16	—	—		—		
Junior.								
Susan Spencer	Pupil Teacher	15	—	—	—	—	—	1st Female Prize, 10s. 6d.
Edward Halland ...	School-boy	13	—	—	—	—		1st Male Prize, 10s. 6d.
James Cribb	Monitor in School ...	14	—	—	—	—		2nd Male Prize, 5s.
Rosina Stone	,, ...	13	—	—	—	—	—	2nd Female Prize, 5s.
George Hart	Clerk	15	—	—	—	—		
Alfred Hodson	Warehouse-boy ...	14	—	—	—	—		
Henry Edmunds... ...	School-boy	13	—	—	—	—		
George Whitehead ...	,, ...	12	—	—	—	—		
Richard Slingo	Pupil Teacher	15	—	—				
Alice Hoskins	,, ...	15	—	—		—	—	
Cordelia Sale	,, ...	15	—	—		—	—	
Helen Perry	Monitor in School ...	13	—	—	—	—	—	
Emilie Vaughan ...	,, ...	14	—	—	—	—	—	
Louisa Langley	,, ...	13	—	—	—	—	—	
Jane Gifford	Pupil Teacher	15	—	—	—	—	—	

5.—Spitalfields and Bethnal-green Local Board.

PRIZES.

Junior.—1st Prize, 10s. 6d.
2nd Prize, 5s. 0d.
3rd Prize, 5s. 0d.
4th Prize, 5s. 0d.

NAMES OF SUCCESSFUL CANDIDATES.	OCCUPATION.	Age.	Arithmetic.	Geography.	English History.	Gospel History.	Needlework.	PRIZES.
Junior.								
William Rusz	Tailor	16	—	—		—		1st Prize, 10s. 6d.
Walter West	School-boy	12	—	—		—		2nd ,, 5s. 0d.
Henry Willis	Monitor	13	—	—		—		3rd ,, 5s. 0d.
George Tuck	,, ...	13	—	—		—		4th ,, 5s. 0d.
Charles Jenkins... ...	,, ...	12	—	—		—		
William Eaves	School-boy	12	—	—		—		
Joseph Bedworth ...	,, ...	12	—	—		—		
Arthur Allen	,, ...	13	—	—		—		
James Oates	Clerk	18	—	—		—		
Henry Walker	Patten and Clog Maker	30	—		—	—		
George Smith	Messenger	17	—	—		—		
David Johnson	Chair Maker	21	—	—		—		

SOUTHERN COUNTIES ADULT EDUCATIONAL SOCIETY—THIRTY-ONE CENTRES.

Senior Candidates.

Number of Candidates Examined .... 54 | Number of Candidates Passed........................ 24

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	Subjects in which each Candidate has Passed.				
			Arith-metic.	Gospel and Acts.	English History.	Geography.	Plain Needle-work.
Benjamin Herth	Abbots Ann school...	19	—	—	—	—	
Wm. Henry Darley ...	Alton school	15	—	—		—	
Charles Bragley	Alton school	15	—	—		—	
John Francis King ...	Blandford school	16	—	—	—	—	
Charles Cook...	Blandford school	16	—	—	—	—	
Walter Lance...	Blandford school	16	—	—	—	—	
James Jeanes...	Blandford school	15	—	—		—	
Frank Jenvey...	Brockenhurst school	18	—	—		—	
Isaac Husen	Chute school	18	—	—	—	—	
Peter Webb	Chute school	17	—		—	—	
William Rutt...	Chute school	13	—	—		—	
William Horsey	Fordingbridge school	17	—	—		—	
Charles Arney	Fordingbridge school	14	—	—		—	
J. Henry Fudge	Lyme Regis school	13	—	—		—	
Edward Page...	Marlborough school	16	—		—	—	
Wm. Leigh	Millbrook school	15	—	—		—	
Harry Cull	Millbrook school	15	—	—		—	
C. J. Goff	Poole school	16	—	—	—		
B. J. Elford	Poole school	19	—		—	—	
J. F. Mitchell	Southampton Athenæum ...	12	—		—	—	
Alfred Gray	Swanage school	15	—	—	—	—	
Charles Farwell	Swanage school	14	—	—	—	—	
Harry Smith	Wilton school...	17	—	—	—		
Joseph Hinton	Wilton school...	17	—	—	—		

Junior Candidates.

Number of Candidates Examined .... 208 | Number of Candidates Passed........................ 84

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	Subjects in which each Candidate has Passed.				
			Arith-metic.	Gospel History.	English History.	Geography.	Plain Needle-work.
John Dance	Abbotts Ann school	18	—	—	—		
Alfred Knight	Abbotts Ann school	15	—		—	—	
Ernest Titt	Abbotts Ann school	15	—	—	—	—	
Everett Lansty	Abbotts Ann school	14	—	—	—	—	
Tom Lansty	Abbotts Ann school	11	—	—		—	
Elijah Lings	Abbotts Ann school	14	—	—		—	
Frederick Muggleton ...	Abbotts Ann school	14	—	—	—	—	
Henry Wild	Alton school	20	—	—		—	
Henry Arnold...	Alton school	20	—	—		—	
John Collins	Alton school	19	—	—		—	
Frederick Andrews ...	Alton school	18	—	—		—	
Robert Arnold	Alton school	17	—	—		—	
George Waltom	Alton school	18	—	—		—	
Frederick Walker	Alton school	15	—	—		—	
John Payne	Blandford school	15	—	—	—		
William Foster	Bournemouth school	22	—	—		—	
Harry Baverstock	Brockenhurst school	14	—	—		—	
James Cutler...	Brockenhurst school	17	—	—		—	
James Symmonds	Brockenhurst school	15	—	—		—	
Sydney Hopkins	Brockenhurst school	15	—	—		—	
Sarah Anne Sherry ...	Buckland Newton school ...	19	—	—		—	—
John Brown	Buckland Newton school ...	22	—	—		—	
Herbert Foot	Buckland Newton school ...	16	—	—		—	
Mendelsohn Thorne ..	Cranbourne school...		—	—		—	
Frederick Goodfellow ...	Cranbourne school...		—	—		—	

SOUTHERN COUNTIES ADULT EDUCATIONAL SOCIETY.

Junior Candidates (*Continued.*)

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	Subjects in which each Candidate has Passed.				
			Arith-metic.	Gospel History.	English History.	Geography.	Needle-work.
James Green	Cranbourne school		—	—		—	
Tom Green	Cranbourne school		—	—		—	
Joseph Still	Cranbourne school		—	—		—	
Charles Hobbs	Chilton school	35	—	—		—	
John Mudge	Chilton school	20	—	—		—	
Thos. Ginaway	Chilton school	42	—	—		—	
Charles Staley	Chilton school	26	—	—		—	
Jeremiah New	Chilton school	16	—	—		—	
Henry Manning	Fordingbridge school	14	—	—		—	
Richard Hicks	Fordingbridge school	15	—	—		—	
Charles Rouse	Fordingbridge school	16	—	—		—	
George Coles	Fordingbridge school	13	—	—		—	
George Huxtabee	Fordingbridge school	14	—	—		—	
William Donn	Fordingbridge school	14	—	—		—	
James Webb	Longbridge Deverell school ...	22	—	—	—		
Thomas Jervin	Longbridge Deverell school ...	13	—	—	—		
Richard Matthews... ...	Longbridge Deverell school ...	12	—	—	—		
John Henry Gibbs... ...	Longbridge Deverell school ...		—	—		—	
Philip Parker...	Longbridge Deverell school ...		—	—		—	
Thomas Freeman	Lyme Regis school...	14	—	—		—	
Henry Hooper	Lyme Regis school...	12	—	—		—	
George Neate...	Marlborough school	14	—	—	—	—	
Charles Glover	Marlborough school	17	—		—	—	
Robert Shipway	Marlborough school	12	—		—	—	
Wm. Bailey	Marlborough school	21	—	—	—	—	
Daniel Dobson	Marlborough school	13	—		—	—	
George Eyears	Osmington school	23	—	—		—	
Henry Hurst	Osmington school	22	—	—		—	
Henry Toomer	Romsey school	14	—	—		—	
Tom Jones	Romsey school	14	—	—		—	
William Sheppard... ...	Romsey school	15	—	—		—	
Arthur Martell	Southampton Athenæum ...	16	—	—		—	
Edwin Watts...	Southampton Athenæum ...		—		—	—	
Alfred White...	Swanage school	16	—	—		—	
John Sweetman	Swanage school	14	—	—	—	—	
William Collins	Swanage school	12	—	—	—	—	
Walter Smith	Swanage school	12	—	—		—	
William Hixon	Swanage school	13	—	—		—	
Henry Wiltshire	Wallop school	16	—	—		—	
Arthur Francis	Warminster school...	16	—	—	—		
Wm. Forman...	Warminster school...	15	—		—	—	
Frank Chiveral	Warminster school...	14	—	—	—		
John Clark	Warminster school...	15	—	—	—	—	
Frank White...	Warminster school...	15	—	—		—	
John Sleigh	Warminster school...	18	—	—	—		
Frederick Kimber	Warminster school...	16	—	—		—	
William Howell	Warminster school...	15	—	—	—	—	
Alexander Abbott	Warminster school...	14	—	—	—		
Thomas Abbott	Warminster school...	15	—	—	—	—	
Samuel Galton	Winterborne Whitchurch school	14	—	—	—		
George Davis...	Winterborne Whitchurch school	15	—	—	—		
Stephen Hope...	Winterborne Whitchurch school	13	—	—	—		
Wm. Lanning	Wilton Institute	16	—	—	—		
Barnabas Coombs	Wilton Institute	11	—	—	—		
Alfred Vincent	Wilton Institute	16	—	—	—		
Charles Morris	Wilton Institute	26	—	—	—	—	
Joseph J. Lisle	Winchester St. Michael's school	13	—	—		—	
Alfred Lay	Winchester St. Michael's school	13	—	—		—	
Alfred Hubbert	Winchester St. Michael's school	11	—	—		—	

WEST RIDING EDUCATIONAL BOARD—FOURTEEN CENTRES.

Senior Candidates.

Number of Candidates examined 84
Number of Candidates passed... 53

NAME OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	Subjects in which each Candidate has Passed.				
			Arith-metic.	Gospel and Acts.	English History.	Geography.	Needle-work.
Charles Burdett Ogden, 1st Prize (Local) ...	Leeds Mechanics' Institution...	13	—	—	—	—	
Henry Prevell, Second Prize (Local)	Marske Literary Institution ...	15	—	—	—	—	
NathanAlexanderMackie, Third Prize (Local) ...	Leeds Mechanics' Institution...	14	—	—	—	—	
Charles Henry Harral ...	Leeds Mechanics' Institution...	13	—	—	—	—	
John William Atkinson .	Leeds Mechanics' Institution...	15	—	—	—	—	
Samuel Wright	Wilsden Mechanics' Institution	19	—	—	—	—	
Joseph Parker	Marske Literary Institution ...	15	—	—	—	—	
William Agar	Marske Literary Institution ...	16	—	—	—	—	
William Davison	Marske Literary Institution ...	14	—	—	—	—	
Thomas Dove...	Marske Literary Institution ...	14	—	—	—	—	
Joe Hepworth...	Stocksbridge Mutual Imp. Soc.	30	—	—	—	—	
Mary Ann Jefferson ...	Ladies'Educational Inst.,Leeds	15	—	—	—	—	—
Alex. Campbell Dixon ...	Thirsk Mechanics' Institution.	17	—		—	—	
Henry Cox	Thirsk Mechanics' Institution.	19	—		—	—	
Edwin Bedford	Leeds Mechanics' Institution...	14	—	—	—	—	
Jonathan Hepworth ..	Stocksbridge Mutual Imp. Soc.	17	—	—	—	—	
William Thomas Beesley	Stocksbridge Mutual Imp. Soc.	24	—	—	—	—	
Maria Elizabeth Gell ..	Ladies'Educational Inst.,Leeds	16	—	—	—	—	—
John Clark Jefferson ...	Leeds Mechanics' Institution...	12	—	—	—	—	
William Hill	Acomb Mechanics' Institute ...	16	—	—	—	—	
John Bennett	Marske Literary Institution ...	25	—	—	—	—	
John Schofield Shaw ...	Leeds Mechanics' Institution...	14	—	—	—	—	
Frank Wildman	Leeds Mechanics' Institution...	13	—	—	—	—	
Joseph Edward Oldroyd.	Leeds Mechanics' Institution...	12	—	—	—	—	
John Mitchell Hole ...	Leeds Mechanics' Institution...	16	—		—	—	
William Wildman... ...	Leeds Mechanics' Institution...	14	—	—	—	—	
John William Pinder ...	Leeds Mechanics' Institution...	17	—		—	—	
Joseph Metcalf	Thirsk Mechanics' Institution.	18	—		—	—	
Joseph Dyson	Leeds Mechanics' Institution...	12	—		—	—	
Thomas Moore	Leeds Mechanics' Institution...	16	—		—	—	
Mary Wilson Ogden ...	Ladies'Educational Inst.,Leeds	15	—	—	—	—	—
George Marvel	Hunslet Mechanics' Institution	30	—	—		—	
John Woolley	Hunslet Mechanics' Institution	22	—	—	—	—	
Stansfield Braithwaite ...	Idle Mechanics' Institution ...	18	—		—	—	
Eliza Barrett	Ladies'Educational Inst.,Leeds	14	—	—	—	—	—
James Stanley Brearley .	Stocksbridge Mutual Imp. Soc.	25	—	—	—	—	
Clara Balfour Andrew ...	Ladies'Educational Inst.,Leeds	13	—		—	—	—
John Alfred Dale Telford	Leeds Mechanics' Institution...	13	—		—	—	
John Newton	Hartlepool Mechanics' Inst. ..	24	—		—	—	
Emma Hardy...	Ladies'Educational Inst.,Leeds	14	—		—	—	—
Walker Bottoms	Wilsden Mechanics' Institution	21	—	—	—	—	
Mary Jane Taylor... ...	Ladies'Educational Inst.,Leeds	15	—		—	—	—
Amos Child	Idle Mechanics' Institution ...	20	—		—	—	
Frank William Lee ...	Leeds Mechanics' Institution...	13	—		—	—	
William Pinder	Leeds Mechanics' Institution...	17	—	—	—	—	
Henry Padgett	Idle Mechanics' Institution ...	20	—		—	—	
John Edward Burrow ...	Leeds Mechanics' Institution...	11	—		—	—	
Elizabeth Marshall ...	Ladies'Educational Inst ,Leeds	16	—	—		—	—
Jonathan Wright	Wilsden Mechanics' Institution	16	—		—	—	
Mary Hannah Crabtree .	Ladies'Educational Inst.,Leeds	18	—	—	—	—	—
John Ardill	Leeds Mechanics' Institution...	13	—		—	—	
Hartley Robinson	Wilsden Mechanics' Institution	20	—		—	—	
Joseph Procter	Farsley Mechanics' Institution	18	—		—	—	

WEST RIDING EDUCATIONAL BOARD.—(*Continued.*)

Junior Candidates.

Number of Candidates examined ... ... 166 | Number of Candidates passed... 107

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	Subjects in which each Candidate has Passed.				
			Arithmetic.	Gospel History.	English History.	Geography.	Needlework.
George Middleton, First Prize (Local)	Marske Literary Institution ...	13	—	—	—	—	
Oliver Pegler (Second Prize (Local)	Leeds Mechanics' Institution...	15	—	—	—	—	
Frederick Sidey, Third Prize (Local)	Leeds Mechanics' Institution...	13	—	—	—	—	
William Stonehouse ...	Marske Literary Institution ...	11	—	—	—	—	
James W. Carr	Leeds Mechanics' Institution...	16	—	—	—	—	
William Digweed	Stocksbridge Mutual Imp. Soc.	16	—	—	—	—	
William Chapman... ...	Marske Literary Institution ...	12	—	—	—	—	
John C. Butterfield ..	Leeds Mechanics' Institution...	13	—	—	—	—	
Emma Ward	Ladies' Educational I., Leeds	15	—	—	—	—	—
John Howe	Marske Literary Institution ...	11	—	—	—	—	
Charles Alfred Smith ...	Leeds Mechanics' Institution...	14	—	—	—	—	
George Milnes	Stocksbridge Mutual Imp. Soc.	12	—	—	—	—	
Herbert Middleton	Marske Literary Institution ...	11	—	—	—	—	
John Simpson...	Hunslet Mechanics' Institution	18	—	—	—	—	
John H. Rayner	Leeds Mechanics' Institution...	12	—	—	—	—	
Thomas Watkins	Marske Literary Institution ...	14	—	—	—	—	
Alfred Rudd	Thirsk Mechanics' Institution	12	—		—	—	
William Fitzhugh... ...	Marske Literary Institution ...	33	—	—	—	—	
John Henry Sanderson ...	Marske Literary Institution ...	11	—	—	—	—	
Robert Wood Lockwood .	Leeds Mechanics' Institution...	13	—	—	—	—	
William Sturdy	Thirsk Mechanics' Institution	14	—		—	—	
Robert Baxter...	Thirsk Mechanics' Institution	12	—		—	—	
Samuel Ingle	Leeds Mechanics' Institution...	12	—	—	—	—	
Thomas Dobson	Marske Literary Institution ...	14	—	—	—	—	
John W. White	Leeds Mechanics' Institution...	15	—		—	—	
Frederick Hill	Hunslet Mechanics' Institution	16	—		—	—	
John W. Jowett	Leeds Mechanics' Institution...	11	—		—	—	
William Sunderland ...	Leeds Mechanics' Institution...	11	—	—	—	—	
Thomas Winterbarn ...	Thirsk Mechanics' Institution	12	—		—	—	
Thomas Farmery	Thirsk Mechanics' Institution	12	—		—	—	
Solomon Brearley	Stocksbridge Mutual Imp. Soc.	10	—	—	—	—	
William R. Swainson ...	Leeds Mechanics' Institution...	14	—	—	—	—	
Mark Parker	Hunslet Mechanics' Institution	16	—		—	—	
William Fynn	Leeds Mechanics' Institution...	12	—	—	—	—	
Grace Alder Gell	Ladies' Educational I., Leeds	13	—	—	—	—	—
John W. Flockton... ...	Leeds Mechanics' Institution...	12	—		—	—	
J. Pullen...	Leeds Mechanics' Institution...	11	—	—	—	—	
William Peeks	Thirsk Mechanics' Institution	12	—		—	—	
John Henry Brook... ...	Leeds Mechanics' Institution...	12	—		—	—	
George Wilkinson... ...	Leeds Mechanics' Institution...	13	—		—	—	
William Fawcitt	Thirsk Mechanics' Institution	12	—		—	—	
Samuel Sanders	Thirsk Mechanics' Institution	13	—		—	—	
James Wilson	Marske Literary Institution ...		—	—	—	—	
George W. Hollway ...	Leeds Mechanics' Institution...	12	—	—	—	—	
Thomas Sturdy	Leeds Mechanics' Institution...	11	—		—	—	
Henry Huggins	Leeds Mechanics' Institution...	10	—		—	—	
John Thomas...	Hebden-bridge Mechanics' I...	18	—	—		—	
John Elliott	Stockton Mechanics' Institution	14	—	—	—	—	
James Robertshaw... ...	Hebden-bridge Mechanics' I...	16	—	—		—	
James D. Sutherland ...	Thirsk Mechanics' Institution	11	—		—	—	
George Best	Thirsk Mechanics' Institution	11	—		—	—	
Matthew Horner	Thirsk Mechanics' Institution	12	—		—	—	
John Ellison	Leeds Mechanics' Institution...	13	—		—	—	
James Ashman	Thirsk Mechanics' Institution	12	—		—	—	
Ellen Maria Rose	Ladies' Educational I., Leeds	13	—	—	—	—	—
Edward Harral	Leeds Mechanics' Institution...	12	—		—	—	
Robert Lee	Thirsk Mechanics' Institution	12	—		—	—	
James Fildes Pearson ...	Thirsk Mechanics' Institution	10	—		—	—	
Henry Child	Leeds Mechanics' Institution...	13	—		—	—	

WEST RIDING EDUCATIONAL BOARD.—(*Continued.*)

JUNIOR CANDIDATES.

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.				
			Arithmetic.	Gospel History.	English History.	Geography.	Needlework.
Henry Kirby	Thirsk Mechanics' Institution	12	—		—	—	
Alfred Wilson...	Hunslet Mechanics' Institution	16	—		—	—	
Samuel Glover	Hunslet Mechanics' Institution	19	—		—	—	
Walter Yewdall	Hunslet Mechanics' Institution	16	—		—	—	
Eleanor Gledhill	Ladies' Educational I., Leeds	14	—	—	—	—	—
George Sunderland ...	KeighleyMechanics'Institution	15	—		—	—	
John Horner	Thirsk Mechanics' Institution	13	—	—		—	
Henry Sopwith	Thirsk Mechanics' Institution	14	—		—	—	
Edward Jackson Hole ...	Leeds Mechanics' Institution...	10	—		—	—	
John William Gill ...	Leeds Mechanics' Institution...	13	—		—	—	
Alfred Thompson	Leeds Mechanics' Institution...	11	—		—	—	
George Powell	Leeds Mechanics' Institution...	12	—	—	—	—	
T. H. Dixon	Leeds Mechanics' Institution...	13	—	—	—	—	
Matilda Shaw...	Ladies' Educational I., Leeds	14	—	—	—	—	—
William H. Mountain ...	Leeds Mechanics' Institution...	12	—		—	—	
W. J. Wilkinson	KeighleyMechanics'Institution	14	—		—	—	
Richard Crabtree	Hebden-bridge Mechanics' I...	16	—	—		—	
Joseph R. Hollway ...	Leeds Mechanics' Institution...	10	—		—	—	
Christopher Hardisty ...	Thirsk Mechanics' Institution	12	—	—		—	
John Bennett...	Stocksbridge Mutual Imp. Soc.	16	—	—	—	—	
Alfred Ogden...	Hebden-bridge Mechanics' I...	17	—	—		—	
John Freeman	Leeds Mechanics' Institution...	11	—		—	—	
Henry Wild	Thirsk Mechanics' Institution	10	—		—	—	
Sarah Brearley	Stocksbridge Mutual Imp. Soc.	15	—	—	—	—	—
Mary Ellen Swallow ...	Ladies' Educational I., Leeds	14	—	—	—	—	—
Maria Swailes...	Ladies' Educational I., Leeds	11	—	—	—	—	—
Sarah J. Atkinson	Ladies' Educational I., Leeds	16	—	—	—	—	—
Sophia Stubbs...	Ladies' Educational I., Leeds	11	—	—	—	—	—
William Marwood... ...	Marske Literary Institution ...	13	—	—	—		
Margaret Handcock ...	Ladies' Educational I., Leeds	11	—	—	—	—	—
Ernest Barker...	Thirsk Mechanics' Institution	13	—		—	—	
Alfred Bradley	KeighleyMechanics'Institution	15	—		—	—	
Nathan Wilman Wright.	Wilsden Mechanics'Institution	14	—	—		—	
Charles Bedford	Leeds Mechanics' Institution...	12	—		—	—	
James Webb	Stocksbridge Mutual Imp. Soc.	15	—	—	—		
W. Bernie	Leeds Mechanics' Institution...	13	—	—	—	—	
Sarah Holwell	Ladies' Educational I., Leeds	12	—	—	—	—	—
Lydia Barningham... ...	Thirsk Mechanics' Institution	14	—		—	—	—
C. H. Nelson	Leeds Mechanics' Institution...	13	—		—	—	
John Munday...	KeighleyMechanics'Institution	14	—		—	—	
Michael Lindsey	Stockton Mechanics'Institution	24	—	—	—		
William Palliser	Thirsk Mechanics' Institution	13	—	—		—	
Annie Stephenson	Ladies' Educational I., Leeds	12	—	—	—		—
Thomas Turnbull... ...	Thirsk Mechanics' Institution	9	—		—	—	
William Horseman ...	Stockton Mechanics'Institution	17	—	—		—	
Thomas Stephenson ...	Thirsk Mechanics' Institution	15	—		—	—	
George Toase...	Thirsk Mechanics' Institution	11	—	—		—	
Thomas Atkinson	Thirsk Mechanics' Institution	14	—	—		—	

WORCESTERSHIRE UNION OF EDUCATIONAL INSTITUTES—FIVE CENTRES.

SENIOR CANDIDATES.

Number of Candidates examined ... ... 9 | Number of Candidates passed 5

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.			
			Arithmetic.	Geography.	English History.	Gospel and Acts.
William Cave	Stourbridge Working Man's Institute	17	—	—	—	
George O. Holloway ...	Kidderminster Mechanics' Inst.	16	—	—	—	
Thomas Kettley	Stourbridge Church of Eng. Young Men's Association	16	—	—		—
William Seckerson ...	Dudley Mechanic's Institution	15	—	—	—	
Thomas Henry Edwards	Dudley Mechanic's Institution	15	—	—	—	

WORCESTERSHIRE UNION OF EDUCATIONAL INSTITUTES—(*Continued.*)

JUNIOR CANDIDATES.

Number of Candidates examined ... ... 42 | Number of Candidates passed 7

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	Subjects in which each Candidate has passed.			
			Arithmetic.	Geography.	English History.	Gospel History.
William Lane	Redditch Lit. & Scientific Inst.	16	—	—	—	
Frederick Hill	Redditch Night School	16	—	—		—
John Parr	Redditch Night School	14	—	—	—	
Thomas Gardner	Kidderminster Mutual Improvement Society	18	—		—	—
Robert Barrow	Redditch Night School	15	—	—	—	
George Dipple	Redditch Night School	14	—	—		—
James Little	Hanley Castle Institute ...	14	—	—		—

FRENCH CUSTOMS DUTIES.

The Lords of the Committee of Privy Council for Trade have received, from the Secretary of State for Foreign Affairs, a copy of a French Imperial Decree, fixing, as follows, the Import Duties on the undermentioned articles:—

Porcelain of all kinds manufactured in Japan and China, and imported directly from either of those countries	10 per cent. ad val., decimes included.
Nankin of India, imported from the country of production in French ships	1f. per kilo.
Nankin from elsewhere	1f. 25c. per kilo.
,, in foreign vessels	1f. 25c. per kilo.
Carpets manufactured in Turkey and other Oriental countries	15 per cent. ad val., decimes included.
Tissues of Cashmere hair, manufactured by hand in non-European countries, however imported	5 per cent. ad val., decimes included.
Tissues of Silk (foulards, plain or printed) of Indian manufacture, whencesoever and however imported	Free.
Tissues of Silk other than foulards or crapes, of India or any non-European country, imported—	
From the country of production, in French vessels	Free.
From elsewhere ... ...,	25c. per kilo.
In foreign vessels	25c. per kilo.
Prepared Skins—	
Parchment, raw or dressed	Free.
Perfumed leather of calf skin, known as Russian leather, imported in French vessels	80f. per 100 kilos.
Ditto in foreign vessels, or by land	86f. 50c. decimes included, per 100 kilos.
Tanned leather, simply tanned for soles, or for other purposes. Pigskin	200f. per 100 kilos.
Ditto others, large ...	45f. per 100 kilos.
Ditto ditto small ...	120f. per 100 kilos.
Curried, for the tops, fronts, and backs, &c., of boots	20 f. per 100 kilos.
Ditto ditto others ...	100f. per 100 kilos.
Prepared with alum, Hungarian tanned	40f. per 100 kilos.
Ditto tawed	50f. per 100 kilos.

Only skins weighing less than one kilogramme will be considered as small skins.

PARAGUAYAN COTTON.

As might have been expected, the call of Britain for cotton has been responded to with decided eagerness by many a State. In Italy, Central Africa, India, South America, Queensland, and other British colonies, where-ever land and climate are adapted to it, cotton is being extensively cultivated, and there is no doubt that our future supplies of the article, instead of being derived as heretofore in the proportion of 80 per cent. from the United States and about 20 per cent. from between India and other countries, will be found to proceed from a large number of sources in a well balanced competition. Among the newest of these competitors for the Manchester market is the republic of Paraguay, in South America.

Cotton there is an indigenous plant, and grows almost spontaneously in all parts of the country, but hitherto the cultivation of it has been almost entirely neglected, owing to the exclusive cultivation of tobacco, want of field labour, want of machines, and other means for advancing this industry among the people. Now, however, that the British market offers such a splendid opening, and that almost fabulous prices are offered for the article, great efforts are being made to take advantage of it.

The President, a most enlightened and vigorous man, has passed laws for the encouragement of the cultivation of cotton, and the result is that some valuable samples have just been sent to this country as an earnest of important supplies for the future. The quantity sent is small, but the want of seed has been a great difficulty in the way of earlier shipments. This, however, has now been surmounted, partly through the instrumentality of the Cotton Supply Association, and partly through the larger quantity of native seed already produced. The quality of the samples just arrived has yet to be ascertained. It was unfortunate that, owing to the dispute with our Government, Paraguay had no place in the Exhibition, and that therefore Paraguayan cotton could not be compared with the many other qualities there exhibited. Some years ago, however, samples of that cotton were sent to the Antwerp Chamber of Commerce, and the report was most favourable, it having been found equal to the best Brazilian cotton. Our relations with Paraguay being now completely restored, it may be hoped that our commerce with that country will largely increase, and it will be well for that Republic if she will devote herself to the cultivation of an article of such prime necessity to this country.

Home Correspondence.

THE NEW TOBACCO ACT.

Sir,—The principal provisions of the new Act, as reported in your *Journal* July 3, page 566, indicate most retrogressive views in the compilers, and are only worthy of the times when the now obsolete corn laws were in full favour. They militate equally against the revenue as against the public, and include all the evils of protection of one portion of Her Majesty's subjects against the other, in their worst form.

Under the new Act the collection of the revenue will be complicated and expensive, and will depend mainly on affidavits confirmed upon oath as to state and quality, which oaths as a rule are more or less false, and have a tendency to induce a solemn disregard for truth.

The principles of true free-trade could have been carried out in this case with great advantage to the revenue and the public, by imposing a fixed duty, no matter the amount, on all tobaccos by weight, irrespective of state or quality, manufactured or unmanufactured. The collection would be simple and inexpensive—so many tons imported, so many pounds sterling duty to pay; and much of that suspicion entertained by the public in regard to fraud and adulteration supposed to prevail in tobacco manufactories would entirely disappear. The words often seen painted up, "No admission on any pretence whatever," may possibly be interpreted in more ways than one.

Under such a system the prohibition of home-grown tobacco, unless the duty be fixed at an exorbitant rate, might be safely abolished, as the home-grown could not compete, either in quality or price, with that imported from the regular tobacco growing countries, while it should always be borne in mind that it is daily proved that as a rule the more moderate duties produce the larger revenue.

I am, &c.,

HENRY W. REVELEY.

Reading.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Royal Institution, 2. General Monthly Meeting.
Tues. ...Ethnological, 8. Professor Busk, "On the Preparation of Figures of the Typical Forms of Human Crania."
Syro-Egyptian, 7½. The Rev. Basil H. Cooper, "On the historical character of the Invasion and Occupation of Egypt by the Shepherd Kings."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.
158. Bills—Savings Banks Acts Amendment (amended).
159. ,, Harwich Harbour (as amended by the Select Committee).
164. ,, Charitable Uses.
150. ,, Stipendiary Magistrates.
160. ,, Sir Robert Hitcham's Charity.
161. ,, Ruthin Charities.
162. ,, Newcastle-upon-Tyne (St. Mary Magdalen Hospital).
Education—Report of the Committee of Council.

Delivered on 16th June, 1863.
333. Barrack Masters—Return.
336. Fisheries (Ireland)—Returns.
337. Geashill Barony—Returns.
165. Bill—Local Government Supplemental (No. 2).

Delivered on 17th June, 1863.
50 (5) Railway and Canal Bills—Sixth Report of General Committee.
311. Navy (Officers' Pay)—Return.
338. Post Office Savings Banks—Return.
341. China—Return.
345. Army Prize Money—Return.
319. Sir J. S. Lillie—Return.
156. Bills—Misappropriation by Servants.
166. ,, Mutiny (East India) Act Repeal.
Brazil (Suspension of Diplomatic Relations with Great Britain)—Copy of Instructions.

Delivered on 18th June, 1863.
324. East India (Civil and Military Funds)—Return.
335. Poor Rates Exemption (Dublin)—Return.
355. Revenue—Return.
356. Population and Revenue—Return.
361. Cotton Manufacturing Districts—Copies of Two Reports, &c.
Mr. Bishop—Extract of a despatch from Sir James Hudson.
Scottish Universities Commission—General Report.

Delivered on 19th June, 1863.
347. Inclosure Commission—Special Report.
357. Nelson Column—Return.
358. Paraguay—Paper.
364. Lord Chancellor's Benefices—Return.
365. Topographical Survey.—Account.
269. East India (Finance and Revenue Accounts)—Paper.
331. Lunacy—Seventeenth Report of the Commissioners.
167. Bills—Inclosure (No. 2).
170. ,, Walmer Vesting.

Delivered on 20th and 22nd June, 1863.
342. Mr. George O'Malley Irwin—Return.
353. Kensington Estate—Returns.
359. Epé—Copies of Despatches.
339. Royal Forests (Essex)—Report from Select Committee.
362. Bankruptcy—Returns.
367. Thames Embankment (South Side) Bill—Minutes of Evidence.
374. Queen Anne's Bounty - Account.
169. Bills—Corporal Punishment in Schools.
171. ,, Thames Embankment (South Side) (as amended by the Select Committee).
172. ,, Partnership Law Amendment (as amended by the Select Committee.
173. ,, Land Drainage (Provisional Orders) (as amended on Re-commitment).
174. ,, Postmaster General (Sale of Land).
Durham University Commission—Report.
Public General Acts—Caps. 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, and 29.

Delivered on 23rd June, 1863.
292. Shannon River—Report by Mr. Bateman.
369. Bethlehem Hospital—Return.
370. Dublin Port—Return.
375. Kensington Gore Exhibition Buildings—Return.
175. Bills—Howth Harbour.
176. ,, Harwich Harbour (as amended by the Select Committee, and on Re-commitment).
Dahomey—Despatches from Commodore Wilmot.

Delivered on 24th June, 1863.
371. Constabulary (Ireland) Paper.
376. Metropolitan New Streets—Return.
377. London University—Return.
168. Bill—Domestic Servants and Apprentices' Protection.

Delivered on 25th June, 1863.
373. Tea, Coffee, &c.—Return.
379. Partnerships (Ireland)—Return.
177. Bills—Salmon Fisheries (Scotland) Act Continuance (with the Amendments made by the Lords).
178. ,, Prisons (Ireland).
179. ,, Nuisances Removal Act (1855) Amendment.
182. ,, Duchy of Cornwall Management,
184. ,, Police and Improvement (Scotland) (Provisional Order).

Delivered on 26th June, 1863.
352. Edinburgh Corporation—Returns.
363. Dundalk Harbour—Return.
385. Private Bill Legislation—Report from Committee.
155. Bills—Casual Poor (Metropolis).
163. ,, Poor Law Board Continuance.
183. ,, Savings Banks Acts Amendment (as amended in Committee, and on Consideration of Bill, as amended).
185. ,, Loan Societies.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 3rd*, 1863.]

Dated 27th February, 1863.
557. A. Dudgeon and G. F. L. Meakin, 4, Martin's-lane, Cannon-street, and E. E. Allen, 5, Parliament-street—Imp. in the construction of underground railways or subways, and in carriages to be used or worked therein.

Dated 23rd May, 1863.
1300. F. Potts and J. Key, Birmingham—Imp. in the manufacture of certain descriptions of iron tubing, and in the means of producing and applying an ornamental case to the same, which said means are also applicable to the production of ornaments in metal for other purposes.

Dated 28th May, 1863.
1337. C. T. Boutel, Quai Mariemont, Brussels—A new or improved instrument for measuring distances and altitudes.
1339. C. E. Laederich, Paris—Imp. in watches.

1343. F. Osbourn, Peckham — Improved apparatus for pressing, smoothing, and finishing garments or parts of garments.
1345. T. Jarvis, Earls-court, Middlesex—Imp. in obtaining vegetable extracts and in apparatus employed therein.
1347. W. Needham and J. Kite, Vauxhall, Surrey—Imp. in expressing liquid and moisture from substances, and in separating the liquid from the solid portions thereof, applicable also to the filtration of liquids.

Dated 29th May, 1863.

1348. E. Ironmonger, 1, Friar-gate, Derby—An improved loose clip and socket joint, applicable to bedsteads, sofas, chairs, and other articles of furniture and of fencing.
1349. A. Abadie, Fecamp, France—Imp. in railway breaks.
1351. J. J. Potel, Saint Quentin, France—An improved method of accelerating the draft in furnaces and fire-places.
1353. R. Barker, Grafton-road, Upper Holloway—Imp. in the manufacture of matches usually termed "Vesuvians."
1355. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture or preparation of lubricating material. (A com.)

Dated 30th May, 1863.

1359. J. Heard, Crediton, Devon—Imp. in apparatus for distributing manure.
1361. S. Bates and J. Jardine, Radford, Nottingham—Imp. in carriages used in machines employed in the manufacture of lace or other fabrics.

Dated 1st June, 1863.

1363. J. Henson, Parliament-street, Westminster—Imp. in the construction of railway carriages.
1365. W. Clark, 53, Chancery-lane—Imp. in apparatus for printing fabrics, paper, and other surfaces in colours. (A com.)
1367. L. S. Chichester, Brooklyn, New York—Imp. in means for drying grain.
1369. A. V. Newton, 66, Chancery-lane—An improved construction of marline spike. (A com.)
1371. H. C. Coulthard, Blackburn—Imp. in packing for the glands of piston rods and other moving mechanism, where it is necessary to prevent the passage of steam or other fluids.

Dated 2nd June, 1863.

1373. A. Illingworth, Halifax—Imp. in boots and shoes or similar coverings for the feet and in the manufacture thereof.
1377. G. A. Barrett, W. Exall, C. J. Andrewes, and A. Barrett, Reading—Imp. in valves and apparatus for regulating the speed of steam engines. (Partly a com.)
1379. E. J. Jarry, 29, Boulevart St. Martin, Paris—Imp. in machinery to be worked by steam or other power, for clearing and ploughing land.
1381. R. Crawford, Beith, Ayr, N.B.—Imp. in jacquard machines used for weaving ornamental fabrics.
1383. W. Gleave and T. Young, Manchester—Certain imp. in apparatus for feeding or supplying water to steam boilers.

Dated 3rd June, 1863.

1387. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in machines for "ginning" cotton. (A com.)
1389. F. S. Barff, Dublin—An improved means of protecting, preserving, and hardening surfaces of brick, cement, stone, stucco, and other analogous substances, which invention is also applicable to the preservation of timber.
1391. J. Portlock, Hampstead road—An improved alarum apparatus.

Dated 4th June, 1863.

1393. S. Blake, T. Lee, and R. Dutton—Imp. in the construction of flour and meal mills.
1397. W. E. Newton, 66, Chancery-lane—Imp. in the construction of casks, barrels, kegs, and other analogous articles. (A com.)

Dated 5th June, 1863.

1398. S. St. Barbe Guillaume, 81, Marland-place, Southampton—Imp. in bricks, and in apparatus to be used in manufacturing the same and in brickwork built therewith.
1399. F. A. Calvert, Manchester—Certain imp. in steam engines, steam boilers, and steam heating apparatus.
1403. T. Gray, Lower Mitcham, Surrey—Imp. in treating flax, hemp, and other vegetable fibrous substances in order to bleach and separate the fibres.
1405. W. Clark, 53, Chancery lane—Imp. in the distillation and separation of hydrocarburets and their derivatives, and in apparatus for the same. (A com.)

Dated 8th June, 1863.

1407. W. A. Brown, 3, Victoria-terrace, Hawks-lane, Canterbury—An indicator for railway trains.
1409. A. J. Hollingsworth, 9, Oxford street, Southampton—A new or improved spirit-compass with screw lever.
1410. C. E. Newcomen, 20, Ovington-square, Brompton—Imp. in the treatment of peat and other substances containing moisture.
1413. W. C. Brocklehurst, Macclesfield, J. Creighton, C. Makinson, and J. Creighton, Manchester—Certain imp. in machinery or apparatus for winding yarns or threads.
1415. W. Clark, 53, Chancery-lane—Imp. in mounting and fitting bedsteads, chairs, and other moveable seats on board ship. (A com.)
1417. F. A. Schofield, Eyam, Derbyshire—Imp. in tools or apparatus for paring, rasping, and scraping the edges of boot and shoe soles and heels.
1419. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the construction of kites. (A com.)
1421. E. Humphrys, Deptford-pier, Kent—Imp. in surface condensers.
1423. H. Reynell, Exeter—Imp. in the manufacture (by the introduction of cocoa nut husk or part thereof) of a substitute for ordinary felt and kamptulicon, and in utilising said cocoa nut husk or parts thereof, for packing of wine coolers, refrigerators, and ice chests, and caulking of ships and vessels.
1425. W. E. Newton, 66, Chancery-lane—Imp. in nozzles for hose and water discharge pipes. (A com.)
1427. T. Page, Adelphi-terrace, Strand—Imp. in propelling vessels, and in apparatus for the same.

Dated 9th June, 1863.

1429. B. Dobson and D. Greenhalgh, Bolton—Certain imp. in machinery or apparatus for preparing cotton and other fibrous substances.
1431. C. Nicquet, Paris—Imp. in apparatus for sorting and washing ores.
1433. R. A. Brooman, 166, Fleet-street—Imp. in the distillation of bituminous substances. (A com.)
1435. H. Martin, Surrey-square, Old Kent-road—Imp. in treating and preparing night soil and sewage with other materials as a manure.
1437. W. E. Newton, 66, Chancery lane—Imp. in the propulsion of ships and other vessels. (A com.)
1439. H. Bessemer, Queen-street-place, New Cannon-street—Imp. in the construction of and mode of working hydrostatic presses and hydraulic apparatus.

Dated 10th June, 1863.

1441. R. Aitken, Cambridge-street, Pimlico—Imp. in the permanent way of railways.
1443. T. Adams, 5, Alfred terrace, Spa-road, Bermondsey—Imp. in slide and other valves, and apparatus connected therewith.
1444. J. Brooke, Bar-street, Laister Dyke, Yorkshire—Imp. in miner's lamps.
1445. W. Wells and J. W. Myers, Manchester—Imp. in apparatus for obtaining artificial light from volatile liquids or fluids.
1447. W. Clark, 53, Chancery-lane—Imp. in locomotive apparatus, which is also applicable to other purposes. (A com.)

Dated 11th June, 1863.

1451. M. Henry, 84, Fleet-street—Imp. in treating floss silk and silk waste, and in apparatus for the same and other like purposes. (A com.)
1453. E. Deane, 1, Arthur-street East, London-bridge—Imp. in cooking and culinary utensils.
1457. W. Walton, Smethwick, Staffordshire—An improved pneumatic hammer, useful also for punching and stamping metals.
1458. J. A. Schlumberger, Basle, Switzerland—Imp. in the preparation of aniline dyes or colouring matters for dyeing, staining, or printing textile substances.
1459. W. Seed, Derby street, Preston—Imp. in machinery for drawing, slubbing, roving, and spinning cotton and other fibrous material.
1461. J. Johnson, Peterborough—Imp. in lubricating apparatus for the cylinders of steam engines.
1463. T. A. Elliott, Enniskillon—Imp. in reefing topsails and courses.

Dated 12th June, 1863.

1464. W. Sims, Reading—A new compound extract to be employed as a means for the cure of deafness.
1465. F. A. Calvert and F. Calvert, Manchester—Imp. in machinery for burring, ginning, cleaning, and carding cotton, and other fibrous substances.
1466. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in the currying and finishing of leather. (A com.)
1467. J. Place, Hoddlesden, Lancashire—An improved combination of materials to be employed for the purposes of sizeing and stiffening.
1468. J. C. Wilson, 14A, Cannon-street—Imp. in machinery for reducing cocoa-nut kernels and other substances to a state of pulp.
1469. J. C. Wilson, 14A, Cannon-street—An improved machine for unhusking rice and other seeds.
1470. G. Bedson, Manchester—Imp. in cupolas and blast furnaces.
1471. T. C. March, St. James's Palace, Westminster—Imp. applicable to the ornamentation or decoration of articles of furniture, part of which imp. may also be applied for architectural ornamentation.
1472. T. H. Milner, Edinburgh—Imp. in thrashing machines. (A com.)
1473. R. Hughes, Worcester—An improved implement or apparatus for scraping and sweeping turnpike and other highways, carriage drives, and footwalks, or other places requiring to be so cleaned.
1474. H. S. Barron, Morant-cottage, Blackheath-road, Greenwich—Imp. in steam fire-engines, parts of which imps. are applicable to steam boilers, and to pumps generally.
1476. G. Davidson, Aberdeen—Imp. in the manufacture of paper bags, and in the machinery employed therein.
1477. J. Jones, Manchester—Imp. in gas regulators.

Dated 13th June, 1863.

1478. G. Davies, 1, Serle street, Lincoln's-inn—An improved mode of oiling journals or axles. (A com.)
1479. T. Wrigley, Bury—Imp. in machinery or apparatus for filtering or cleansing water or other fluids.
1480. J. Hopkinson, Manchester—Imp. in the mode of securing or fastening the ends of metal bands, and in machinery for preparing the same.

1481. Major-General W. N. Hutchinson, Plymouth—Imp. in means of and apparatus for cleansing ships' bottoms and sides.
1483. T. A. Elliott, Enniskillin—Imp. in the construction of and in the means of ballasting ships and other vessels.
1486. M. B. Westhead, Manchester—Imp. in adapting tapes, ribbons, and other such narrow fabrics or thread to surfaces from which they may be unwound, or upon which they may be rewound.
1487. I. G. Bass and W. Bass, Broughton Little, Cumberland—Imp. in the manufacture of nails and spikes.
1488. H. G. W. Wagstaff, Radnor-terrace—Improved apparatus for feeding steam boilers with water, which apparatus is also applicable for raising water.
1489. F. S. Robson, Hendon-house, Sunderland—Imp. in apparatus for working the rudders of vessels, and in auxiliary steering apparatus.
1490. J. Shand, Upper Ground-street, Blackfriars-road—Imp. in the arrangement and construction of steam fire engines and in steam boilers for the same, such boilers being applicable to other purposes.

Dated 15th June, 1863.

1493. T. Cope, Liverpool—Imp. in the construction of rocking horses, and in giving additional motion thereto. (A com.)
1494. H. B. Barlow, Manchester—Imp. in machinery for opening and cleaning cotton and other fibrous substances. (A com.)
1495. I. B. Harris, Fountain-bridge, Edinburgh—Imp. in the manufacture of flexible and other tubes.
1496. J. Juckes, jun., 1, Armaught-road, Roman-road, Old Ford, Bow—Imp. in furnaces.
1499. W. Clark, 53, Chancery-lane—Certain imp. in engines for obtaining motive power from steam or other liquids, also partly applicable to pumps. (A com.)
1500. Captain P. P. L. Stafford, St. James's-square—Imp. in firearms.

Dated 16th June, 1863.

1501. J. J. Shedlock, Vincent-street, Westminster—Imp. in valves for the passage of steam, gas, and fluids.
1503. W. Manwaring, Banbury—Imp. in harvesting machines.
1505. J. Lightfoot, Accrington—Imp. in fixing mordants in the processes of dyeing and printing textile fabrics or yarns.
1506. J. G. Jennings, Palace-road, Lambeth, and M. L. J. Lavater, Bath-street, Newgate-street—Imp. in moulding and vulcanising articles of india-rubber.
1507. W. Score, 30, St. Paul's road, Camden-town—Imp. in the manufacture of candles and soap.
1509. A. J. Fraser, Water-lane, Great Tower-street—Imp. in apparatus applied to house and window sashes for the working and fastening thereof.
1510. W. Neill, jun., Bold, near St. Helen's—Imp. in steam engines.
1511. J. C. Onions, Birmingham—Imp. in smiths' and other bellows.
1512. R. A. Brooman, 166, Fleet street—Imp. in protecting or preserving the silvering or quicking on glass and in the manufacture of glass vessels for silvering and quicking. (A com.)

Dated 17th June, 1863.

1513. W. H. Dawes, West Bromwich—Imp. in the manufacture of iron.
1514. J. Banwell, Watlington, Oxfordshire—A combined machine for collecting and placing in rows, or collecting and elevating into a waggon or elsewhere, hay, corn, or other agricultural produce.
1515. J. Mills, sen., Sunderland—Imp. in the square rigging of vessels.
1516. J. Newman, Crayford, Kent—Improved means of, and apparatus for, boiling in vacuo at a low temperature.
1517. J. F. Spencer, Newcastle-on-Tyne—Imp. in steam, gas, and water tube joints.
1521. T. Purdie, 314, Oxford-street—Imp. in the plastering, colouring, and decoration of walls and ceilings
1523. W. Naylor, Queen's-road, Dalston—Imp. in apparatus for compressing, holding, and regulating the pressure of gas.

Dated 18th June, 1863.

1524. J. A. Sparling, Upper Hornsey-rise—Imp. in twisting and winding silk, and in the machinery or apparatus to be employed therein.
1530. R. Jobson, Dudley—Imp. in machinery for making moulds to be employed when casting metal.

Dated 19th June, 1863.

1532. H. Reynolds, Fleet-street—An improved method of rendering atmospheric air fit for illuminating purposes, and of increasing the illuminating power of inflammable gas.
1538. A. Morel, Roubaix, France—Imp. in traction engines.
1542. M. Henry, 84, Fleet-street—Imp. in decorticating grain and seeds, and in the application of the products obtained by and materials used in decorticating. (A com.)

Dated 20th June, 1863.

1546. G. Haseltine, 12, Southampton-buildings, Chancery-lane—An improved oil, more especially designed for mixing paints and colours, and new mode of manufacturing the same (A com.
1550. C. Peterson, Newport, Isle of Wight—A new material or compound applicable to the manufacture of pipes or tubes, to caulking or covering ships' bottoms, and to other useful purposes.
1552. H. Macaulay, Rotherham—Imp. in covers or appliances for the rims, borders, or top edges of chamber utensils, applicable also to commodes and water-closets.
1554. A. T. N. Goll, Caledonian-road—Imp. in the manufacture of mountings or settings for precious or other stones.
1556. W. L. Winans and T. Winans, Dover-street—Imp. in couplings for propelling shafts of ships or vessels.
1558. W. L. Winans and T. Winans, Dover street—Imp. in adapting propellers for propelling ships or vessels for ocean navigation.

Dated 22nd June, 1863.

1564. J. McLean, Dander-hall, West Calder, N.B.—Imp. in treating oil from shale or other bituminous minerals, and similar oils to obtain various products therefrom, and in apparatus therefor.
1568. W. Rowan, Belfast—Imp. in pistons.
1570. W. L. Winans and T. Winans, Dover-street—Imp. in adapting propellers for propelling ships or vessels.
1572. W. L. Winans and T. Winans, Dover-street—Imp. in the construction or arrangement of the working parts of engines for actuating the propelling shafts of steam vessels.
1574. C. T. Burgess, Gower-street—Imp. in reaping machines.

Dated 23rd June, 1863.

1580. T. F. Parsons, Maindee, Christchurch, Monmouthshire—Certain imp. in the mode or modes of preparing plates, bars, or other objects of iron for being coated with metals or alloys.
1582. W. L. Winans and T. Winans, Dover-street—Imp. in steam boilers.
1584. W. L. Winans and T. Winans, Dover-street—Imp. in the arrangement of apparatus for superheating steam in steam boilers.
1586. A. Mein, Hope Iron Works, Station-street, Stratford—Imp. in apparatus for generating steam.
1588. W. Toovey, 3, Rue de la Pompe, Brussels—Imp. in photolithography, photozincography, and photographic engraving on copper or steel plates, or on any other suitable substances.

Dated 24th June, 1863.

1594. J. L. Hughes, Leek-road, Hanley, Staffordshire—Imp. in ornamenting porcelain.
1596. A. E. Brae, Leeds—Imp. in apparatus for actuating domestic bells and other signals by the electric current.

Invention with Complete Specification Filed.

1599. D. Hussey, Nashua, New Hampshire, U.S.—Having reference to bobbins and the winding of roving or yarn thereon.—25th June, 1863.

Patents Sealed.

[*From Gazette, July 3rd*, 1863.]

July 3rd.
13. F. C. Bakewell.
48. E. V. Gardner.
49. J. G. Dahlke.
65. J. H. Johnson.
69. C. Allen.
70. R. T. Monteith and R. Monteith.
72. C. Worssam.
79. E. T. Hughes.
87. R. Luthy.
101. J. B. Fenby.
135. L. P. Josse.
216. W. Mellor and W. Whaley.

[*From Gazette, July 7th*, 1863.]

July 7th.
75. C. E. Gray.
103. D. Tannahill and J. Tannahill.
105. J. T. Stroud.
123. E. Morewood.
203. T. Lambert.
252. F. W. Wymer.
271. C. H. G. Williams.
272. A. Pritchard.
288. F. Tolhausen.
320. C. Faulkner, D. Faulkner, J. Fairley, and W. C. Stiff.
913. H. W. Ripley.
983. W. E. Newton.
1043. A. V. Newton.
1060. J. Marris and W. Marris.
1075. J. Rowley.
1125. W. C. Wilkins.
1137. A. V. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, July 7th*, 1863.]

July 1st.
1593. H. H. Bishop.
1594. J. A. Salmon.

July 2nd.
1609. J. Morris.
1613. W. Skinner.
1633. B. Lambert.
1660. F. C. Warlich.

July 4th.
1628. W. Hood.
1631. W. F. Thomas.
1636. B. Mitchell.
1640. J. Leslie.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, July 7th*, 1863.]

June 30th.
1531. E. Rogers and H. Mackworth.
1578. J. Lewtas and J. Humphreys, jun.
1586. R. Shaw.

July 2nd.
1597. E. C. Healey and E. E. Allen.

July 4th.
1583. L. Blackstone.

Journal of the Society of Arts.

FRIDAY, JULY 17, 1863.

WOOD-CARVING EXHIBITION.

The Council have decided to hold another Exhibition of Wood-Carvings next year, and to offer Prizes for competition, the particulars of which will be duly announced.

EXAMINATIONS, 1863.

The papers of questions set at the Society's Final Examinations in May last, are now published, and may be had of the Society's publishers, Messrs. Bell and Daldy, Fleet-street, price 6d.

INTERNATIONAL EXHIBITION AT PARIS IN 1867.

The following notice appeared in the *London Gazette* of the 14th inst.:—"The Board of Trade have received a copy of a French Imperial Decree, providing that a Universal Exhibition of agricultural and industrial productions shall take place at Paris in 1867, in the Palace of Industry, Carré de Marigny. The Exhibition will be opened on the 1st of May of that year, and will be closed on the 30th of September following. The productions of all nations will be admitted. A further decree will determine the conditions to be observed and the nature of the various articles which will be admitted."

THE COLONY OF VICTORIA, AUSTRALIA.

The following particulars have been compiled by Mr. J. G. Knight, F.R.I.B.A., Secretary to the Commissioners for Victoria at the International Exhibition of 1862, and Honorary Secretary of the Victoria Emigrants' Assistance Society:—

The Australian continent is at present divided into five distinct colonies—each being perfectly free and independent of the other, and (with the exception of Western Australia) each having a political constitution and parliament of its own choice. From the official documents circulated by the Colonial Commissioners in the International Exhibition, it appears that in 1861 the population of these colonies and of Tasmania was as follows:—

Victoria	540,322
New South Wales	350,860
Queensland	30,059
South Australia	128,000
Western Australia	16,000
Tasmania	89,977

It will thus be seen that Victoria possesses the greatest number of inhabitants of any colony in Australia; but, comparatively large as this may seem, it is insignificant viewed in relation to the capacity of the country; the area of Victoria being 86,831 square miles, or about the size of England, Scotland, and Wales united.

The extraordinary increase of population in Victoria may be judged by the following extract from a pamphlet circulated by the Commissioners for that colony, at the International Exhibition or 1862:—

"In the year 1836, the census of Port Phillip, now called Victoria, gave the following returns:—Males, 142; females, 35—total, 177. At that time, and up to the year 1851, Port Phillip was a province of New South Wales. The population of the latter in 1836 was 77,096. In 1851, Victoria was separated from the government of New South Wales, and started as an independent colony, with 77,345 inhabitants. The population of the adjoining and parent colony was at that time 197,168 persons, or 119,823 more than Victoria.

"Since the year 1851, the increase of population in Victoria has been unprecedented in the annals of British colonies. In 1861, the census enumeration gave the following numbers:—Males, 328,651; females, 211,671—total, 540,322 persons, or 189,462 more than the parent colony of New South Wales."

Should further proof be needed to illustrate the wonderful advancement of Victoria during the last few years, it is supplied by a statement appended to a volume of the *Ballarat Star*—a newspaper shown in the Victoria Court, at the International Exhibition—with the following preface:—

"When the Great Exhibition of 1851 was opened, the only habitation on the site of the present town of Ballarat was a shepherd's hut, built of slabs of wood, and roofed with bark. In a circle, having Ballarat as a centre, with a radius of forty miles, the population then did not exceed 500 persons, and consisted of a few sheep-farmers and their dependents. The population of the same area, when the census was taken in 1861, was 105,996 persons. At the same date the population of the town of Ballarat was 22,111 persons. At the present time (December, 1861), in the district around the town of Ballarat, there are published four bi-weekly newspapers, and in the town of Ballarat one weekly and two daily newspapers."

Climate.

The climate of Victoria is most genial, closely resembling that of Italy. The mean temperature of the air, according to the observations of Professor Neumayer, extending over a number of years, is 57° 6″; the clearness and purity of the atmosphere exercising a strong influence on the habits and temperament of the inhabitants, who certainly appear more cheerful, buoyant, and happy than those who dwell in colder latitudes. Notwithstanding the general beauty and serenity of the climate of Victoria, it is not denied that occasionally, in the summer months, the hot winds are unpleasant and trying, but these drawbacks are not of frequent occurrence, very rarely exceeding twelve hours in duration at one time, and are not so severe in Victoria as in the neighbouring Australian colonies. The north winds, although at the time disagreeable, are of great sanitary advantage in preventing malaria; and there is always this comfort to sustain one under their influence, that they are invariably succeeded by invigorating and refreshing breezes from the south. As a whole, so delightful is the climate that colonists returning to Europe look back to Victoria with regret, and in few instances are they able to endure the east winds and fogs of England.

From the elaborate statistics compiled by the Registrar-General of the colony, it is manifest that intending emigrants have nothing to fear on the score of general health. The rate per cent. of births, marriages, and deaths in Victoria as compared with England is as follows:—

	Victoria.	England.
Births	3·834	3·406
Marriages... ...	1·031	0·826
Deaths	1·941	2·229

It will thus be seen that there are proportionally more births and marriages, and fewer deaths, in Victoria than in England.

Mineral Products.—Gold.

Notwithstanding the general ignorance which prevails with regard to the position held by Victoria in the group of distinct colonies comprised by the continent of Australasia, its great mineral wealth has exercised a most im-

portant and beneficial influence on the monetary affairs of Europe during the last few years.

Those who visited the Exhibition of 1862, will doubtless remember the "gold trophy" which stood under the eastern dome. This pyramid represented the mass of gold exported by the colony of Victoria in ten years ending the 1st of October, 1861, the quantity being 26,162,432 oz. troy, or 800 tons 17 cwt. 3 qrs. 7 lbs., and its value £104,649,728 sterling. The pyramid is now erected at the Crystal Palace, a base being added to show the further quantity produced in the year ending Oct. 1st, 1862, this being 1,817,408 oz., or 55 tons 12 cwt. 2 qrs. 22¼ lbs., of the value of £7,269,632.

The yield of gold from the mines of Victoria is very commonly attributed to Australia generally, but this is a great mistake. The figures above quoted refer to the colony of Victoria alone, and do not include the gold-fields of New South Wales and New Zealand, from whence also large quantities of the precious metal are constantly being added to the wealth of the world. The largest nuggets or lumps of gold ever discovered in the world have been found at Victoria; one of these nuggets, called the "Welcome," found at Ballarat, sold for £10,500; another, the "Blanche Barkly," sold for £6,905; another, the "Sarah Sands," sold for £5,532; two others, sold at Dunolly for £5,500; another, called the "Lady Hotham," valued at £3,020. Two nuggets found at Ballarat sold for £7,500. The "Heron" nugget, value £4,080, was found by two young men who had been only three months in the colony. In August, 1860, a nugget of the value of £3,336 was found at Ballarat, at a depth of 400 feet from the surface. About the same time one was found at Kingower worth £3,220 within a foot of the surface. Similar lumps of gold have been discovered from time to time within a few feet of the surface, while in the great reefs and deep sinkings, some of which have now reached a depth of between 500 and 600 feet, rich deposits of the precious metal are constantly being met with.

Since the discovery of gold in Victoria, hundreds of nuggets have been found, and they are still frequently to be met with; by every monthly mail received from the colony instances of such discoveries are recorded. The last "nugget" of importance was found at Dunolly, on the 14th of January, 1863, its weight being 20 lbs. 7 oz., and its value £988. It was found at a depth of 14 feet, in a deserted claim, by a man who had only been about five minutes on the ground.

That the goldfields of Victoria are likely to afford profitable employment for ages to come to a great body of miners may be reasonably inferred from the able reports of Mr. Selwyn, the Government geologist, according to whose opinion the extent of ground in Victoria, which is more or less auriferous, is upwards of 20,000 square miles, or about one-quarter of the entire area. This does not include Gipps Land on the eastern coast of Victoria, as the geology of that district has not been investigated, but there also extensive gold fields have been discovered. The extent of ground which is supposed to have been exhausted in mining during the past eleven years, and from which gold to the value of £112,000,000 sterling has been produced, does not exceed 160 square miles. Within the last few years great improvements have taken place in the several branches of gold mining, especially in the extraction of gold from quartz. This work is now conducted on a large scale, and with machinery and scientific appliances of a very superior kind, so that quartz which was formerly considered too poor for crushing, and which in some cases did not contain more than four or five dwts. of gold to the ton, can even with that small per-centage be now worked at a profit. The value of the mining plant employed in Victoria is estimated by Mr. Brough Smyth, secretary for mines, at £1,299,303.

Victoria is not only rich in gold; silver has recently been discovered, and one or two mines are now being successfully worked. Tin ore and antimony are abundant, and large shipments of these valuable minerals are made to Europe. A block of antimony, weighing half a ton, was exhibited in the court of the International Exhibition.

Iron ore abounds in many parts of Victoria, and in the neighbourhood of Sandhurst thousands of tons are exposed on the surface of the earth.

The existence of coal was known in Victoria many years ago, but not till very lately has any attempt been made to develope the coal fields of the colony. A company is now profitably employed in working a coal-mine at Cape Patterson, and already a large quantity of excellent coal has been forwarded to Melbourne. The development of the coal-fields of Victoria will prove a powerful impetus to many new branches of manufacturing industry.

Kaolin, another mineral product of great utility, exists in inexhaustible quantities in many parts of Victoria; and in one district, Bulen, not far from Melbourne, a company is now profitably employed in manufacturing kaolin into a variety of useful articles. Immense beds of pipe-clay, from which the finest pottery can be made, are spread over many parts of the colony.

Many diamonds have been accidentally found in the Buckworth district. Mr. Martin, an extensive diamond merchant of London, who has examined some of the diamonds from Victoria, is of opinion, from the nature of the locality in which they have been met with, that a lucrative trade in diamonds would be opened if proper means were adopted to prospect the creeks in which these precious stones have been discovered.

Wool.

Next to gold in point of value, but, perhaps, of primary importance in point of utility, the wool produce of Victoria affords the most astonishing evidence of the material progress of the colony.

In the year 1837 the quantity of wool exported was of the value of £11,639. In the year 1862 the quantity was 87,055 bales, or 26,812,940 lbs., of the value of £2,234,416.

The following statistics of wool imported into Great Britain, for the year 1862, are published by Messrs. Gooch and Cousens, of London:—

	Bales.
Victoria	87,055
New South Wales and Queensland	59,130
South Australia	34,020
New Zealand	26,658
Tasmania	16,862
Western Australia	2,290
Total (called Australasian)	226,015
Cape of Good Hope	66,841
East India	52,749
Germany	29,238
Spain	1,994
Portugal	11,482
Russia	40,302
Sundry other places	139,047
Total	567,668

It will thus be seen that the colonies called "Australasian" export nearly one-half of all the wool received by Great Britain during the past year.

The export of tallow and hides from Victoria for ten years ending 1860, amount to—

	£	s.	d.
Tallow	£552,339	0	0
Hides	796,203	0	0
The imports to Victoria for the year 1862 amounted to ...	12,788,696	0	0
And the exports to	12,314,062	0	0
The Revenue for the past year (1862) was	3,131,420	7	4
Against in 1861	2,886,091	13	10

Showing an increase of £245,328 13s. 6d.

The spirit and energy which characterise this colony (it is but twenty-seven years since it was first started, with

a gross population of 177 persons, and but twelve years since it was made an independent colony) may be gathered from the following statement of expenditure made on public improvements during the last few years:—

From 1851 to 1860 the amount of Government expenditure on sundry Public Works was	£4,211,753
On public Roads and Bridges from 1851 to December, 1861	5,272,620
Government Railways to Geelong, Ballarat, Castlemain, and Sandhurst, 219 miles ...	7,828,233
Lines of Electric Telegraph, 1,504 miles, and stations	163,000
The cost of supplying water to Melbourne, was	820,000

The reservoir for last-named purposes at Yan Yean covers an area of 1,300 acres, at an average depth of 18ft. The reservoir is 595ft. above the city, and 19 miles from the city.

In addition to the Government railways, there are several suburban lines under the management of public companies.

There are 600 miles of main road formed and macadamised, and 500 miles of main road cleared. These are independent of the roads within the jurisdiction of the various corporations and municipalities throughout the colony.

The Post-office revenues for the year 1861 amounted to £127,869, and the expenditure to £109,479. In the conveyance of the inland mails, the number of miles travelled was 1,511,381. The number of post-offices in Victoria in that year was 365; 5,166,149 letters, and 2,818,761 newspapers were posted in the course of the year. 1,762,566 letters, and 2,086,979 newspapers received and despatched by ship during the above time.

There are 884 places of public worship, with accommodation for 150,000 persons. There are 665 public schools, having 46,687 scholars, and receiving government aid to the amount of £110,155 per annum. There are 221 private schools, with 4,981 scholars.

The Melbourne University has 104 students, and confers degrees, which, by the pleasure of her Majesty, are equal in rank and consideration with the Universities of Great Britain. The public library contains 30,000 volumes, and is attended on an average by 485 readers daily. The Museum of Arts, recently opened, has been visited on an average by 200 persons daily.

The number of hospitals, benevolent institutions, and asylums (there are no workhouses) in Victoria is thirty, receiving government aid to the amount of £90,894, and private contributions amounting to £53,718 per annum. There are about 4,000 volunteers in the colony, comprising cavalry, artillery, engineers, and riflemen, who are all in a highly efficient state of drill. The colonial government has in contemplation a comprehensive scheme of coast defences.

In 1860 there were ten savings banks, having 11,349 depositors, with a total balance of £540,622; equal to an average of £47 12s. 9d. per head.

Agriculture.

The cereals grown in Victoria are generally admitted to be equal to the best of similar produce in any part of the world. The samples of wheat and oats shown at the International Exhibition were pronounced by the jurors to be the finest collection ever exhibited, in proof of which opinion it is sufficient to say twenty-five medals, and twenty honourable mentions were awarded to Victorian grain, by far the highest commendation given to any British colony. Samples of this produce may still be seen at the office of the Victoria Emigration Assistance Society, 27a, Bucklersbury, London, E.C. Fruits of all kinds grow in profuse abundance, and attain a great size (the collection of model Victorian fruits, which were shown at the Exhibition, may now be seen at the Royal Horticultural Gardens, Kensington, and the Royal Botanic Gardens, Kew). The cultivation of the vine is rapidly extending in many parts of Victoria, and it is confidently expected that in a few years' time the colony will carry on a large and profitable export trade in wine. In the mean time the local demand for colonial wine is already sufficient to cause a sensible reduction of the duties received on imported wine, beer, and spirits. It is calculated that a vineyard will yield on the average a profit of £100 an acre per annum.

Cotton.—Many parts of the colony are well adapted for the growth of cotton, and some of the colonists have commenced its cultivation.

Flax can be grown in most parts of the colony, and the silk worm thrives remarkably well; its favourite food, the mulberry, grows here in great perfection.

Arrowroot.—This plant thrives well, and can be easily and profitably cultivated.

Tobacco.—The growth of this plant is now being carried out on a large scale, a considerable impetus being given to this branch of agriculture by an eminent firm in Melbourne offering £110 per ton for all the leaf tobacco supplied to them.

The olive, orange, lemon, pine apple, melon and other tropical fruits thrive well in the open air and require but little attention. The experiments which have been tried on the tea plant, &c., go to prove that it could be successfully cultivated in Victoria.

Building Materials.

The materials required for building purposes are plentiful throughout the colony, and samples of several kinds may be inspected at the office in Bucklersbury. Bricks equal to any made in England, stone of various qualities, from granite to the softest free stone, and a variety of useful and ornamentat descriptions of timber afford every facility for building either temporary huts or permanent and handsome edifices, at a reasonable cost.

Social Condition.

A glance at the last census of Victoria, wherein the occupations of the people are clearly stated, will show that the community at large is settled down to the ordinary pursuits of life, and those who have recently visited the colony will attest that law, order, and morality are as well, if not better observed, in Victoria than in England.

Life and property are certainly safer at the "Antipodes." Shutters to houses are rarely applied, and in the summer months the windows in most cases are left open—a proof that there is but little petty larceny. The fashion of "garotting" has not been introduced, and the evil disposed are kept in check by an admirably conducted administration of police.

Occupation of Land.

After some years of controversy a comprehensive land law has been enacted by the Parliament of Victoria, which certainly gives to the new comer a great advantage over the old settler in the colony. Many large tracts of land, which under the former system of sale by auction would have realised £20 to £30 per acre, can under the new regulations be obtained, by selection, at 20s. per acre—one-half of which is on long credit.

A pamphlet, fully explanatory of the measure, prepared by the Hon. C. G. Duffy, the Minister of Lands, has been freely circulated throughout the kingdom, and can be had at the office of the Emigration Society, gratis.

It appears that there are ten million acres of good agricultural land available for settlement, in addition to large areas reserved for public use, as public commons, and unstocked country, suitable for sheep and cattle stations. The land in the agricultural areas is divided into farms, varying from 40 to 640 acres, and is sold at the uniform price of £1 per acre. The purchaser can pay at that rate for one half the farm selected by him, and rent the other half for eight years, at 2s. 6d. per acre, at the end of which time the land so rented becomes his property.

Labour.

The following rates are quoted in "Warman's Weekly Circular," January 19th, 1863:—

WITHOUT RATIONS.

Carpenters, per day, 8 hours	8s. to 10s.
Masons, ditto	10s.
Bricklayers & Plasterers } ditto	8s.
Blacksmiths ditto	10s.
Quarrymen ditto	6s.
Able pick and shovel men, 1s. per hour, or	7s.
Fencers, 3 rails, 2s. to 2s. 6d. per rood.	

WITH RATIONS.

First-class Ploughmen, per week	20s.
Bullock drivers ditto	15s. to 20s.
Ploughmen, from 3 to 6 months hire, per ann.,	£40 to £45
Mowers, per acre, from	3s. 6d. to 5s.
Haymakers, per week	20s.
Binders ditto	25s. to 30s.
Reapers, per acre, and according to crop	14s.
Cradlers, from	25s. to 30s.
Garden labourers, per week	15s.
Milkmen	15s. to 20s.
Gardeners, per annum	£52 to £55.
Shepherds, ditto	£30 to £35.
Cooks, per week, from	20s. to 45s.
Waiters, from	20s.

Customary rations per week are, 12 lbs. flour, 12 lbs. meat, 2 lbs. of sugar, ¼ lb. tea.

FEMALE SERVANTS.

Cooks and Laundresses, per annum	£30 to £35
Housemaids ditto	£26 to £30
Competent women for general house work	£30
Upper-class Housemaids	£26
Nurse girls, from	£14 to £20
Needlewomen	£26 to £30
If they are dressmakers	£35

Really good servants in private houses frequently obtain higher wages than the above rates. The writer of this, who returned from Victoria a year ago, paid his cook £40; housemaid, £33; nursemaid, £28. They were excellent servants, and had been in his service for some years.

It is not unusual for young women in domestic service, who are well conducted and good looking, to marry persons in thriving circumstances, and to be comfortably settled in life; but it is a great mistake for young women who contemplate emigrating to any part of Australia to suppose that they are likely to have offers of marriage directly they arrive in the colonies. The young men in Australia are as cautious in selecting eligible and useful wives as in England.

It is but reasonable to suppose that where labour can command remunerative wages, capital can also be most profitably invested. Such is certainly the case in Victoria; money commands a highly remunerative rate of interest, and a large field exists for opening up new industries and manufacture. There is ample scope for the safe investment of capital in mining; sheep farming, cattle and dairy stations; vineyards, and general agriculture; the formation of tributary lines of rail and tram-ways; irrigation, and various other sources of essential benefits to the colony, and of increased wealth to the capitalist. The high dividends paid by the Colonial Banks also prove that there is abundant employment for money.

Cost of Living.

The following are the current prices of some of the necessaries of life:—

	s. d.		£ s. d.
Fine Flour, per ton			12 10 0
Potatoes, per cwt.			0 9 0
Fresh Butter	2 0	to	0 2 3
Beef, per lb.	0 4	to	0 0 5
Mutton ,, ...	0 3	to	0 0 4½
Veal	0 7	to	0 0 9
Pork ,, ...	0 8	to	0 0 9
Turkeys, each	10 0	to	0 12 0
Geese, per pair	8 0	to	0 10 0
Ducks, ,, ...	6 6	to	0 8 0
Fowls, ,, ...	5 6	to	0 7 0
Eggs (fresh), per doz.	1 6	to	0 2 0

The rent of a four-roomed cottage is from 5s. to 10s. per week.

The above rates are taken from the *Argus*, of January, 1863, at which time, the middle of an unusually hot summer, the prices of many things would be dearer than at any other time of the season.

In May, last year (1862), the following rates were quoted:—

	s. d.		s. d.
Beef, per lb.	0 2	to	0 4½
Mutton ,, ...	0 3	to	0 4½
Turkeys, each	6 0	to	8 0
Geese, per pair	8 0	to	12 0
Ducks ,, ...	5 0	to	5 6
Fowls ,, ...	4 0	to	5 0
Bread, 4lb. loaf	0 6	to	0 7
Milk, per quart			0 6
Potatoes, per cwt.	5 6	to	6 0

The rates will probably be about the prices at a corresponding period of the current year.

The Customs-duties being low, and a direct trade in produce being carried on with all parts of the world—tea (2s. 6d.), coffee (1s. 6d.), sugar (4d.), tobacco (4s. 6d.), wine, spices, &c., are always cheaper than in England; and the consumption per head of most of them is double that in this country. Spirits alone show of late years a steady diminution in consumption.

The extensive and varied collection of produce shown by Victoria at the International Exhibition was the subject of general praise and favourable comment in all the reviews and notices of that national enterprise. The display made by this colony has been officially pronounced as "embracing the largest and most varied collection of objects ever sent by a British colony to Europe:" a judgment which appears to be verified by the following list of awards made by the jurors of the International Exhibition.

	Medals.		Honourable Mentions.
Victoria	111	...	92
New South Wales ...	76	...	50
South Australia ...	25	...	18
Queensland	26	...	20
Western Australia ...	15	...	12
Tasmania	38	...	26
New Zealand ...	31	...	11
Canada	60	...	26
India	133	...	90

In referring specially to Victoria as a field for emigration, it is not for one moment intended to draw invidious comparisons between it and the neighbouring colonies of Australia, all of which present advantages, and hold out inducements to the surplus working population of Great Britain, of which few are aware. The aim of this little sketch is to point out some of the characteristics of this particular colony, and by reference to statistics to suggest that a country which could develop so much in so short a space of time is capable of doing much more in future.

EMPLOYMENT OF CRYOLITE IN MANUFACTURES.

The following is extracted from the *Chemical News*:—

A few years ago cryolite was found only as rare specimens in mineralogical collections. M. H. Rose was the first to propose this mineral as a raw material for the manufacture of chemical products. On the discovery of large deposits of this body, he indicated its utilisation in the manufacture of soap. He had remarked that by

boiling cryolite, which is a double fluoride of aluminium and sodium, with milk of lime, a double decomposition took place, giving rise to fluoride of calcium, an insoluble compound, and soluble aluminate of soda, which is available instead of caustic soda in the saponification of fatty matters.

In 1860, M. Weber, of Copenhagen, obtained from the Danish Government the monopoly of the cryolite deposits in Greenland. In his manufactory he treats the mineral by sulphuric acid, and transforms the resulting sulphate of soda into carbonate of soda and sulphate of alumina.

In 1860, MM. Müller, of Berlin, and Hasberg, of Harbourg, entered into an agreement with M. Weber, who undertook to furnish them with 1,000 tons of cryolite per annum. This cryolite M. Hasberg decomposes in the following manner:—

The mineral is broken up and ground in vertical cast-iron mills. This is easily effected, and the mineral is then sifted by means of inclined bolters.

One hundred parts of this cryolite are mixed with 127 parts of carbonate of lime also reduced to powder. These quantities correspond to one atom of cryolite and six atoms of calcareous carbonate. The mixture is placed in a reverberatory furnace with two compartments, and heated with coke. The operation is two-fold,—that is to say, the mass is first dried in the cooler part of the furnace, and then made red-hot in the other. When properly heated, the mass is withdrawn by means of fire-irons, and thrown on a grating, which retains the conglomerated pieces. These pieces are pounded, and used in the following operation.

Cryolite is transformed into aluminate of soda and insoluble fluoride of calcium by means of carbonate of lime. The powder, after being calcined, is taken away in sheet-iron boxes, and lixiviated in the manner usual in soda factories.

Besides fluoride of calcium and ferric oxide, the brown residuum contains a small excess of undecomposed cryolite and traces of aluminate of soda. No use has, as yet, been found for this material.

The aluminate of soda solution thus obtained has a slight brown colour. It is introduced into cylindrical sheet-iron cauldrons, placed horizontally, and furnished with stirrers, into which the gases of the reverberatory furnace are passed. Besides the products from the combustion of coke, these gases contain carbonic acid from the carbonate of lime, and are sufficiently hot to give aluminate of soda the right temperature for obtaining oxide of aluminium as a compact precipitate.

A draught is obtained from a ventilator placed at the end of the cylindrical cauldrons.

Carbonic acid completely decomposes aluminate of soda in a few hours. The separation of oxide of aluminium from the carbonate of soda is effected by decantation in very tall sheet-iron cauldrons.

The solutions of carbonate of soda are evaporated to obtain *soda* and *soda crystals*; but the greater part of these liquids is treated by hydrate of lime to produce hydrate of soda. Products prepared in this way are very pure. The carbonate of soda naturally contains no chloride, and is contaminated only by traces of sulphite and hyposulphite proceeding from the impurities of the coke.

The caustic soda furnished by the Harbourg factory contains 75 per cent. of oxide of sodium; we find besides from 4 to 5 per cent. of carbonic acid. The hydrate of alumina is perfectly white, and quite free from iron.

The sulphuric acid required for the transformation of hydrate of alumina into sulphate is prepared in the same factory by the combustion of sulphur. The sulphur furnaces are constructed of bricks, joined by a cement composed of lime and chloride of sodium, which is gradually converted into a very resisting mixture of sulphates of lime and soda. For nitric acid, a mixture of Chili saltpetre and sulphuric acid is substituted, and is put into small cast-iron cauldrons. One hundred parts of sulphuric acid require about seven and-a-half parts of nitric acid.

M. Sauerwein proposes to treat cryolite by the wet way —hydrate of lime taking the place of carbonate. By boiling one part of cryolite with six of hydrate of lime are formed fluoride of calcium and aluminate of soda.

Decomposition takes place readily. M. Sauerwein's reaction is so far analogous to that produced in the Harbourg factory by the dry way, but he does not decompose aluminate of soda by carbonic acid; to obtain hydrate of soda he treats the aluminate by a fresh quantity of cryolite, so as to transform all the soda into fluoride and the aluminium into hydrate.

Simply boiling the aluminate with the cryolite produces the double decomposition.

Thus are formed a solution of neutral fluoride of sodium and a hydrate of alumina precipitate mixed with the excess of cryolite employed. The deposit, properly washed, is treated by weak sulphuric acid, which dissolves only the alumina.

By boiling fluoride of sodium with hydrate of lime we obtain a precipitate of fluoride of calcium, hydrate of soda remaining in solution. This process has the advantage over that used at Harbourg of requiring less fuel; but the sulphate of alumina is impregnated with small quantities of iron, proceeding from the hydrate of lime used for the decomposition.

By treating cryolite by hydrate of lime, M. Tissier obtained only a third of the aluminium in the state of aluminate of soda. M. Sauerwein did not arrive at the same results; he obtained all the sodium and aluminium contained in the cryolite, with the exception of the losses unavoidable in such operations.

By using for the decomposition of the cryolite only half the lime required for the transformation of the aluminium into aluminate of soda, we obtain simultaneously the mixture of aluminate and cryolite necessary to the formation of fluoride of sodium and hydrate of alumina. Thus the two operations can be amalgamated by boiling the cryolite with a quantity of calcareous hydrate insufficient to produce the solution of fluoride of sodium. The author is, however, of opinion that the first process is preferable, because it is to be feared that in dissolving the alumina in sulphuric acid, the fluoride of calcium will be partially decomposed by the sulphuric acid, which would then be wasted.

The treatment by carbonate of lime by the wet or dry way seems preferable to treating cryolite by sulphuric acid, as is done at Copenhagen, where a mixture of sulphate of soda and sulphate of alumina is obtained and purified by repeated crystallisations. The sulphate of alumina is, of course, contaminated with all the impurities of the cryolite; moreover, sulphate of soda is of much less value than either the carbonate or hydrate.

It is also possible that cryolite, decomposed by an insufficient quantity of sulphuric acid, may be transformed into soluble sulphate of soda and fluoride of aluminium. The fluoride of aluminium might be treated separately; but in this case also the soda would be obtained only as sulphate, and M. Sauerwein has not ascertained whether this reaction is practicable.

COTTON IN INDIA.

The following letter has been addressed to the Secretary to the Supreme Government of India:—

Sir,—Having understood that the Government of India is desirous of receiving suggestions from experienced individuals, regarding the best means of causing a considerable increase in the production of herbaceous cotton throughout India; I venture to offer, with all due respect, the following for consideration.

1. The necessity of obtaining an immediate supply to relieve the existing lamentable distress of the cotton mill operatives at home is obvious.

2. In no country but India can an adequate enlarged cultivation be effected.—For although it is probable that

more cotton is grown in China than in the British territories; no means of getting any can be devised in the present state of that empire.—From America it is equally hopeless; in all other producing countries the total is small, as compared with our wants.

3. Taking the adult population of India wearing cotton at 140 millions (children under 10 years use little or none) and that for each person 20 yards of common cotton cloth are required annually, weighing 4lbs; there is now grown for this number, 560 millions of lbs.

4. To increase this quantity materially, I submit that the following measures must be adopted forthwith, notwithstanding the known objection that Government have to interfere in any manner with private enterprize, for this should be considered an exceptional and urgent case of calamity, which no individual efforts in cultivation can permanently relieve within any moderate period, and it cannot be expected that the present charities will be much longer continued in the same degree.

5. A cotton department to be established at each presidency, to consist of one or more members, a secretary and requisite assistants, also inspectors for each district or collectorate, where some kind of cotton can be grown, and I believe there are few, if any, where it cannot.

6. Revenue collectors and commissioners of districts to act under the orders of the said cotton department.

7. That they be directed to organise the local establishments necessary for conducting the transactions in cotton, all of which to be under the control of the said collectors.

8. Public notice to be given that all lands cultivated *bonâ fide* with cotton shall be free of tax or impost of any description for five years.

9. Government waste lands required for cotton to be given free of rent on lease for five years, and to revert to Government in the event of the lessee omitting to cultivate them with cotton.

10. The lessee to have the right of giving up such lands at any time after a crop, for which an advance has been received, have been delivered.

11. Government to reserve the right of objecting to grant leases of lands, when such may be considered inadvisable.

12. Cotton seed to be supplied to the ryot free of cost when it can be obtained.

13. Cash advances to be made, without interest, to the cultivators at the discretion of the local authorities, to be repaid in cotton or money at the option of the ryot; when the crop is gathered and cleaned, Government to have a lien on all such cotton.

14. Cultivators to have the right of selling their cotton grown under advance from Government to any party, after having repaid such advance.

15. The rates which Government will be willing to purchase clean cotton from the ryots and others, whether under advance or not, to be fixed as early as possible in each year.

16. Cotton in transitu to be free from all tolls or imposts.

17. Collectors to issue notice that all clean, good cotton will be received for the first year, and paid for on delivery, at specified district stations, at the rate of ten annas (15d.) per lb. for American and other exotic qualities, and five annas per lb. for the indigenous or native sorts.

18. The cotton so purchased to be either forwarded to the nearest usual shipping port and disposed of by public auction or sold in the same manner in the locality, after a notice of not less than one month.

19. The experiments conducted for 12 or 13 years by that eminent botanist and zealous public servant, Dr. Wight, have proved, that all the American cottons (with the exception perhaps of "Sea Island") can be successfully grown in India, when due discrimination is used as respects soil, climate, and mode of cultivation, and to promote this, especially as regards the New Orleans variety, should be the chief object. It was a matter of great general regret that Dr. Wight's operations were ordered to be suspended; but his services, if they could be obtained, would now be invaluable. There are, however, many scientific and practical men in India known to Government, who could materially aid in forwarding the great object in view; which is by supplying cotton to relieve half a million of operatives from misery and pauperism.

20. It is known that a crop of cotton may be gathered in six or seven months after being planted, and in no country are equal facilities to be found for increasing the cultivation within less than 10 years in a five-fold degree. We have a teeming population unoccupied two-thirds of their time, cheap labour, extensive tracts of uncultivated land, genial soils and climate, moderate taxation, a fostering Government, and peace.

21. For many years previous to 1847, I conducted a series of experiments in cotton on a small scale in Travancore with most of the American kinds, and some others, in order to ascertain the effects of a variety of soil on each sort. The issue of these proved that with due attention to the preparation of soil, cotton of the best quality (excepting Sea Island) could be raised. The price of this article was then, however, so low in Europe, as to hold out no inducement for extensive culture, nor had I the means of carrying it out.

22. It is known that some parties are now extending the growth of American cotton of excellent staple in India, but the produce, even in the aggregate, must for some years be comparatively limited.

23. I have abstained from going into detail on various points, such as cleaning machinery, temporary buildings, qualities, &c., &c., from a fear of trespassing further on your attention.

24. It is possible that some loss may be experienced in carrying these proposals into effect, but when the improving condition of our revenue is considered, that we have some 16 or more crores of rupees in treasury balances —now known to be 19¾ crores—that from six to seven millions of wages are annually lost to our suffering operatives in England, and that the value of our cotton manufactures exported from the United Kingdom in 1861 was computed to have exceeded 55 millions sterling, more than three-fourths of which was made from American grown cotton, a sacrifice by Government of even half a million annually, in adopting this scheme, might be warranted and sustained with eventual advantage to millions of our fellow-subjects, for we should in less than 10 years be almost wholly independent of America. In the event of war with that country, the supply from thence would be cut off, when the same distress that now prevails must ensue.

Requesting you will have the goodness to bring this communication to the notice of the Right Hon. the Governor-General of India, I am, &c.,

W. HUXHAM.

Calicut, 9th March, 1863.

EXAMINATION PAPERS, 1863.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(Continued from page 569.)

GEOMETRY.

THREE HOURS ALLOWED.

1. If one side of a triangle be produced, the exterior angle is greater than either of the interior opposite angles.

2. If a straight line fall upon two parallel straight lines, it makes the alternate angles equal to one another, and the exterior angle equal to the interior and opposite upon the same side, and likewise the two interior angles upon the same side together equal to two right angles.

3. Parallelograms upon the same base, and between the same parallels, are equal to one another.

4. Describe a parallelogram equal to a given rectilineal figure, and having an angle equal to a given rectilineal angle.

5. If a straight line be divided into two equal parts, and also into two unequal parts, the rectangle contained by the unequal parts, together with the square of the line between the points of section, is equal to the square of half the line.

6. One circle cannot touch or cut another in more than two points.

7. In equal circles the angles which stand upon equal circumferences are equal to one another, whether they be at the centres or the circumferences.

8. Describe an isosceles triangle having each of the angles at the base double of the third angle.

9. Similar triangles are to one another in the duplicate ratio of their homologous sides.

10. In right-angle triangles the rectilineal figure described upon the side opposite the right angle is equal to the similar and similarly described figures upon the sides containing the right angle. Why are the words "Similarly described" necessary?

11. If two straight lines be parallel, and one of them is at right angles to a plane, the other shall also be at right angles to the same plane.

12. Every solid angle is contained by plane angles, which together are less than four right angles.

Problems.

1. If, from a point without a parallelogram, lines be drawn to the extremities of two adjacent sides, and of the diagonal which they include; then of the triangles so formed, that which has the diagonal for its base is equal to the sum of the other two.

2. Trisect a parallelogram by lines drawn from a given point in one of its sides.

3. Given the base, the altitude, and the difference of the two sides of a triangle: construct it.

4. In any triangle the squares of two sides are together double of the two squares of half the base, and of the straight line joining its bisection with the opposite angle.

5. Given two circles, it is required to find a point from which tangents may be drawn to each, equal to two given straight lines.

6. A chord of a circle is drawn cutting a diameter at an angle which is equal to half a right angle, the sum of the squares of the two portions of the chord is equal to twice the square of the radius.

7. If a circle roll within another of twice its size, any point in its circumference will trace out a diameter of the larger circle.

8. Show that a circle may be inscribed in any quadrilateral figure if the sums of its opposite sides are equal.

9. Describe a circle which shall pass through a given point, and touch two given equal circles.

10. The rectangle contained by the sides of any triangle is to the rectangle of the radii of the inscribed and circumscribed circles as twice the perimeter is to the base.

MENSURATION.

THREE HOURS ALLOWED.

1. Multiply 5 feet 7 inches by 3 feet 9 inches by the method of cross multiplication; explaining by a diagram each step in the process.

2. The length of a side of a triangle is 9 feet 9 inches, and its distance from the opposite angle is 6 feet 5 inches, the length of another side is 8 feet 3 inches; find its distance from the opposite angle, employing the method of duodecimals.

3. The diagonal of a sheet of paper is twice as long as one of the sides, which is 10·5 inches; find the length of the other side.

4. Lay down the figure of the field and find its area from the following notes:—

	AC.	
	1,300	
	890	680 to D.
to B 220	215	
	⊙A	

Find what would have been the notes of this field if B D had been taken as the main line.

5. Find the area of a four-sided figure of which two opposite sides are parallel.

The roof of a room 20 feet square rises in four compartments to the height of 12 feet, and terminates in a skylight 10 feet square; find the cost of slating it at £2 17s. per square.

6. What would be the cost of the covering and guttering of the roof of a church with lead at £1 19s. per cwt., the length of the roof being 82 feet 9 inches, and its girt 65 feet 3 inches, and the breadth of the guttering 1 foot 9 inches, the thickness of the lead $\frac{1}{5}$th of an inch, and the weight of a square foot of lead an inch thick being 59 lbs.?

7. Supposing a French metre, which is one ten millionth part of the fourth of a meridian on the earth's surface, to be 39·37 inches, find the number of miles in the earth's diameter.

8. Find the area of a segment of a circle, having given (1) the chord and the diameter, (2) the height and the diameter, (3) the height and the chord.

9. A cube is divided into two parts by a plane which passes through one angle and the diagonal of one of the opposite sides; compare the volumes of the two parts into which the cube is divided.

10. If a sphere and the circumscribing cylinder be cut by two planes at right angles to the axis of the cylinder, the surfaces of the sphere and cylinder between these planes will be equal.

11. A gallon contains 277·274 cubic inches; what would be the diameter of a bushel measure supposing its depth to be equal to its diameter?

12. How much of the earth's surface is visible from a balloon five miles high? Approximately.

13. The height of a cone is 10 feet 6 inches, its slant side 12 feet 9 inches; find its volume.

14. Find the content of a haystack with a circular base.

TRIGONOMETRY.

THREE HOURS ALLOWED.

1. If A, B, C, be a triangle, and $\text{Sin.}^2 A = \text{Sin.}^2 B + \text{Sin}^2 C$, show that it is right-angled.

2. Prove the formulas:—

(1.) $\text{Tan. } A + \text{Sec. } A = \tan\left(\frac{A}{2} + \frac{\pi}{4}\right)$

(2.) $\frac{\text{Sin. } A + 2 \text{ Sin. } 3A + \text{Sin. } 5A}{\text{Sin. } 3A + 2 \text{ Sin. } 5A + \text{Sin. } 7A} = \frac{\text{Sin } 3A}{\text{Sin } 5A}$

3. Find the sine 18°, tan. 37° 30′, and sec. 54°.

4. If A, B, C, be a right-angled triangle, C being the right angle and C D, C E be drawn making angles α & β, with the hypothenuse, the area of C D E,

$$= \frac{a^2 b^2}{2 c^2} (\text{Cot. } \alpha - \text{Cot. } \beta.)$$

5. Show that—

$\text{Sin. }(A + B) \text{ Sin. }(A - B) = (\text{Sin. } A + \text{Sin. } B)(\text{Sin. } A - \text{Sin. } B)$

$\text{Cos. }(A + B) \text{ Cos. }(A - B) = (\text{Cos. } A + \text{Sin. } B)(\text{Cos. } A - \text{Sin. } B.)$

6. A vessel appears due north of an observer, and four miles distant; half an hour afterwards it is due east, and at the end of another half hour it disappears in the S.E. Find its course and nearest distance from the observer.

7. In a triangle prove $c^2 = a^2 + b^2 - 2ab \text{ Cos. } C$. Then show how this formula may be adapted to logarithmic computation.

8. Solve the triangle when a, A, and $b + c$ are known.

9. Expand Sin. x in terms of the powers of x.

If $x =$ Cosec x, show that $x \doteq \frac{557}{550}$ nearly.

10. A, B, C, are three points in a straight line, in the same vertical plane with an object P; AB $= a$, BC $= b$; the angle of elevation of P from B is twice as great as from A; and from C three times as great. Find the height of P.

11. In a spherical triangle find Cos. a in terms of the cosines and sines of the angles.

12. The angles at the base of an isosceles spherical triangle are equal.

13. In a right-angled spherical triangle, if D be the length of the arc CD, drawn at right angles to the hypothenuse AB, show that—

$$\text{Cot. } D = \sqrt{\text{Cot. }^2 a + \text{Cot. }^2 b}.$$

14. Prove the formulas—

$$\text{Cos. } \tfrac{1}{2}(A + B) \text{ Cos. } \tfrac{1}{2} c = \text{Cos. } \tfrac{1}{2}(a + b) \text{ Sin. } \tfrac{1}{2} C$$
$$\text{Cos. } \tfrac{1}{2}(A - B) \text{ Sin. } \tfrac{1}{2} c = \text{Sin. } \tfrac{1}{2}(a + b) \text{ Sin. } \tfrac{1}{2} C$$

CONIC SECTIONS.

THREE HOURS ALLOWED.

Section I.—Geometrical Conics.

1. Define the conic sections (1) as plane sections of a cone, (2) in reference to a focus and directrix. From the latter definition deduce methods for describing a parabola by continual motion and by points.

2. Prove that the tangent at any point of a parabola bisects the angle between the focal distance and the perpendicular on the directrix. What form does this theorem take in the ellipse and hyperbola?

3. If MP is an ordinate to a parabola at the point P, prove that PM^2 = 4 AS. AM. What modifications are required in this theorem when the co-ordinate axes are oblique?

4. If two chords of a parabola intersect each other, the rectangles contained by their segments are in the ratio of the parameters of the diameters which bisect the chords.

5. If S and H are the foci of an ellipse, and P is any point on the curve, prove that SP + PH = 2CA; and hence prove that the tangent at P is equally inclined to SP and HP.

6. If the normal to an ellipse at P meets the major axis in G, show that SG : SP :: CS : CA.

7. Define conjugate diameters of an ellipse; and show that the area of a parallelogram circumscribing an ellipse and having its sides parallel to a pair of conjugate diameters is constant.

8. A part of a branch of the hyperbola is drawn; how do you ascertain it to be a part of a hyperbola? Find its centre, axis, foci, directrices, and asymptotes.

9. Prove that the area of the triangle contained between the asymptotes of a hyperbola and the tangent at any point is constant.

10. A series of parallel chords is drawn in a circle; the diameter is drawn at right angles to all, at the extremities of which tangents are drawn to the circle. The circle is projected into an ellipse; what are the projective theorems of the lines?

Section II.—Analytical Conics.

11. Construct formulæ for passing from one rectangular system of co-ordinates to another rectangular system. The equation to a straight line being $y = b$, what is the equation when the axes are turned through 45°?

12. Find the length of the perpendicular from (2,7) on $ax + by + c = 0$.

13. Prove that all angles in the same segment of a circle are equal to another, and that the angle *of* a segment greater than a semi-circle is greater than a right angle.

14. If the base of a triangle is given, and one base angle is twice the other, prove that the locus of the vertex is a hyperbola, of which the angle between the asymptotes is 120°, and the centre is at a tri-secting point of the base.

15. Prove that the point of intersection of a tangent to a parabola with the perpendicular on it from the focus is in the tangent of the parabola at its vertex.

16. Prove analytically the theorems contained in questions 5, 6, 7, 9, of the preceding section.

17. Show that the equation of the second degree may always be reduced to $y^2 = 4\,MX + NX^2$. When does the equation represent (1) an ellipse, (2) a parabola, (3) a hyperbola?

(To be continued.)

Proceedings of Institutions.

Greville House (Paddington) Working Men's Library and Reading Room.—The sixth annual report states that the attempt made more than six years ago by a few friends to establish a reading-room and library for working men in Paddington, has met with considerable success, and the committee desire to record their thankfulness for the present flourishing state of the Institution. It is impossible, however, not to express some regret that an undertaking which has for years been conferring real benefit on the mechanics and artisans of the neighbourhood, has, as yet, attracted but a limited degree either of notice or support from the richer classes. There is now a library of nearly 1,200 volumes, from which the members can take books home; a reading-room, furnished with the principal journals and with various periodicals; and a system of evening classes, where reading, writing, arithmetic, mechanical drawing, and singing are taught. There is also a Bible-class weekly. The terms of subscription are twopence per week for the use of the library and reading-room, subject to a reduction when a member subscribes by the month or quarter. The charges for the classes are 6d. per month, and 1s. 3d. per quarter, for writing and arithmetic; and 8d. per month, or 1s. 6d. per quarter, for drawing. There is an elementary and an advanced singing class. Members of the Institution pay 1s. per quarter for the former, and 1s. 6d. per quarter for the latter. Non-subscribers to the Institution are admitted to the classes on a higher scale of payments. The number of members on the books at present is about 230, of whom about 110 pay extra, and avail themselves of the classes, or some of them. The number of books taken out of the library during 1862, was about 4,300. Prizes were offered to the members of the Institution for the study of "Paley's Natural Theology," and of "The Chemistry of Creation," and were extremely well competed for, though by a smaller number of candidates than might have been wished. The committee look to the gradual development of this system of examination as likely to prove of sterling value to the Institution, both by attracting to it the most intelligent of the working-classes, and by encouraging them to to turn their attention to solid and elevating acquirements. A public meeting was held, at which Mr. Robert Hanbury, M.P., kindly presided, and delivered the prizes to the successful candidates. The meeting was also addressed by the Rev. A. Boyd, Mr. Martin Ware, jun., Mr. MacGregor, and other friends; and the Greville House band performed several pieces of music. The subjects for examination for 1863, are "Lessons on Morals"—a well-known work, attributed to Archbishop Whateley,—and "The Science of Health"—a very useful treatise on sanitary subjects. In the course of the past year, Greville House has been brought into union with the Society of Arts. The band, the commencement of which was noticed last year, has been maintained with much zeal, and now numbers about thirty-two performers. It is in contemplation to rein-

force it, by the addition of reed and stringed instruments. The owner of a plot of waste ground near at hand having kindly placed it at the disposal of the Institution during the summer months, a cricket club was set up, and was very popular during the long evenings. The elocution class has also been a source of much interest, and has borne fruit in some spirited recitations, on the occasion of the annual soirée of the members and their friends, in the winter quarter. The usual course of lectures has been given, and the committee feel that their most grateful acknowledgments are due to the gentlemen whose kindness has enabled them to offer to their members instruction and recreation skilfully combined. The balance sheet shows that the expenditure has been £337 16s. 2d., and that there is a balance due to the treasurer of £22 14s. 8d.

Notting-hill Working Men's Institute. — The quarterly meeting was held at Stormont House on June 29th. The chair was taken by Wm. Anketell, Esq. The minutes of the last meeting having been confirmed, a discussion ensued upon the finances of the Institution, a heavy debt being due to J. E. Gray, Esq., Treasurer. Some members suggested the removal of the Institution to a more central spot, but the meeting generally deemed it inexpedient to do so at present. The Treasurer addressed the meeting on the subject of Adult Education, and advised the members to avail themselves of the advantages offered by the "Metropolitan Association for Promoting the Education of Adults," with which Association the Institution was in Union. He introduced Mr. H. H. Sales, the Secretary of that Association, and requested him to explain the plans and operations of the Association. Mr. Sales said that the experience of the Notting-hill Institution was the same as that of the majority of Institutions established for the mental improvement of the working classes. There was a general complaint that the classes for instruction did not flourish to the extent that was to be desired. The Metropolitan Association did not announce that it had found a golden remedy for the evil deplored, but the Society of Arts had now, for some years past, endeavoured to give to the pupils of such Institutions the same stimulus to exertion as was afforded to the students of the middle and upper classes through the medium of the Universities, and in this work the Metropolitan Association was successfully co-operating. He then entered into the details of the scheme of Examination—compared the results of the various Local Boards already established—and, from the statistical returns, illustrated the good the Association had accomplished since its establishment. He expressed his opinion that the same satisfactory results would be gained from the establishment of a Local Board in connection with the Notting-hill Institution. Several speakers cordially approved of the scheme, and two gentlemen volunteered to conduct classes during the ensuing winter season. The Chairman expressed a most favourable opinion of the operations of the Metropolitan Association, and on behalf of the meeting thanked Mr. Sales for the statement he had made. After the transaction of some general business, a cordial vote of thanks to the Chairman closed the proceedings.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 27th and 29th June, 1863.

366. Kitchen and Refreshment Rooms (House of Commons)—Second Report.
387. Naval Receipt and Expenditure—Return.
45 (5). Trade and Navigation Accounts (31st May, 1863.)
319 (1). Carriages (Metropolis)—Further Return.
390. Kensington Gore Museum—Estimates, Plans, &c.
396. Kensington Gore Exhibition Buildings—Copy of Reports.
181. Bills—Poisoning.
188. „ Bakehouse Regulation (Lords Amendments).
190. Bills—English Church Services in Wales (amended in Committee, and on Re commitment).
191. „ Prison Ministers (Lords Amendments).
192. „ Public Works (Manufacturing Districts) (amended).
North America (Trade with Matamoros) — Correspondence (No 11.)
Brazil (Decision of His Majesty the King of the Belgians in the case of the Officers of the *Forte*) —Correspondence.
Brazil (Case of the vessel *Prince of Wales*)—Memorandum.
Greece (Union of the Ionian Islands)—Despatch (No. 3.)

Delivered on 30th June, 1863.

351. East India (Civil Fund)—Return.
382. Exhibition Building—Captain Fowke's Estimate.
386. St. Ive (Liskeard) School—Return.
396. Kensington Gore Exhibition Buildings—Reports (a corrected copy).
397. Election Petitions Bill—Report from the Select Committee.
186. Bills—Election Petitions (as amended by the Select Committee.)
189. „ Stipendiary Magistrates (amended).
193. „ Misappropriation by Servants (amended.)
Poland—Correspondence relating to the Negotiations of 1814 and 1815.

Delivered on 1st July, 1863.

50 (6.) Railway and Canal Bills—Seventh Report of the General Committee.
360. Miscellaneous Receipts (1862-3)—Return.
381. Fire Insurances—Return.
392. Education (Ireland)—Annual Report.
395. Brazil (Officers of the "Forte")—Copy of Case submitted to His Majesty the King of the Belgians.
396 (1.) Kensington Gore Exhibition Buildings—Further Return.
194. Bill—Removal and Punishment of Prisoners.
Brazil (Liberated Slaves)—Correspondence.
Poland—Translations of Papers.

Delivered on 2nd July, 1863.

344. Lime Light—Copy of Reports.
384. Kitchen and Refreshment Rooms (House of Commons)—Third Report.
391. Factories—Copy of Memorials, &c.
195. Bills—Security from Violence (Lords Amendments).
196. „ Thames Embankment (North Side) (Lords Amendment).
127. „ London Coal and Wine Duties Continuance—Lords Amendments).
198. „ Public Works and Fisheries Acts Amendment.
Greece—Papers (No. 4).

Delivered on 3rd July, 1863.

368. Stone Weirs—Return.
394. East India (Religious Endowments)—Return.
398. Metropolitan Police (Finsbury)—Return.
202. Industrial and Provident Societies (Friendly Societies in England—Return.

Copies of the under-mentioned Papers, presented by Command, will be delivered to Members of Parliament applying for the same at the Office for the Sale of Parliamentary Papers, House of Commons :—

41. Queen's University (Ireland)—Report.
42. Royal Dublin Society, &c.—Report.
43. Judicial Statistics, 1862.
44. Public Works (Ireland)—Thirty-first Report.

Delivered on the 4th and 6th July, 1863.

399. Admiralty Court (Ireland) (Sittings, &c.)—Return.
401. Scientific Institutions (Dublin)—Return.
403. Volunteers—Paper.
259 (1.) Shannon Fisheries—Further Return.
378. Bishops Appointment Fees; Ordination, &c., Fees—Return.
406. Mhow Court Martial—Paper.
410. Civil Contingencies Fund—Accounts.
200. Bills—Greenwich Hospital (Provision for Widows).
201. „ Union Relief Aid Acts Continuance.
199. „ Navy Prize Money, &c. (amended).
202. „ Vaccination (Scotland) (as amended in Committee, and on Consideration of Report).
203. „ Nuisances Removal Act (1855) Amendment (amended).
206. „ Pilotage Orders Confirmation.
207. „ Waterworks Clauses.
209. „ Companies Clauses.
Children's Employment Commission (1862)—First Report.
North America (No. 12) Seizure of the "Will o' The Wisp —Correspondence.

Session 1862.

307 (D.) Poor Rates and Pauperism—Return (D.)

Delivered on 7th July, 1863.

405. Sydney Mint—Return.
407. Lieutenant Tinling—Return.
380. Trade and Manufactures (Scotland)—Return.
205. Bills—Waywardens Contracts.
208. „ Railway Clauses.
210. „ Vaccination (Ireland) (Lords Amendments).
211. „ Growing Crops Seizure (Ireland).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 10th*, 1863.]

Dated 21st March, 1863.

758. J. M. Hetherington, Manchester—Imp. in machinery or apparatus for combing cotton and other fibrous materials.

Dated 28th May, 1863.

1335. F. R. Piltz, Frederick-street, Hampstead-road—Imp. in the mode of producing ornamental surfaces, applicable to the general purposes of decoration.

Dated 30th May, 1863.

1357. E. T. Hughes, 123, Chancery-lane—Imp. in apparatus for the transmission of motive power. (A com.)

Dated 4th June, 1863.

1395. Madame L. De Wailly, Paris—An improved method of preserving carpets from the effect of dust.

Dated 8th June, 1863.

1411. J. Hogg, jun, 49, Fleet-street—Imp. in the manufacture of show cards.

Dated 11th June, 1863.

1454. C. L. V. Tenac, Tredegar, Monmouthshire—An imp. in railway wooden sleepers.

Dated 13th June, 1863.

1484. A. Méhu, Petit Talard, near St. Malo—An improved helm for working the rudders of ships or vessels.

Dated 15th June, 1863.

1492. J. Forrester, Burslem, Staffordshire—Imp. in the manufacture of bricks, quarries, slabs, tiles, earthenware pipes, and other earthenware or ceramic articles.

Dated 16th June, 1863.

1502. F. S. Williams, Boston—An improved apparatus for shaping plastic materials and hot but not melted metals by means of pressure, percussion, or rolling. (A com.)

1508. J. Steele and W. Mason, Leeds—Imp. in apparatus for removing the bran or outer skin from wheat and other grain.

Dated 17th June, 1863.

1518. W. Crofts, New Lenton, near Nottingham—Imp. in the production of fabrics by lace machinery, and in means or apparatus employed therein.

Dated 18th June, 1863.

1526. W. S. Lowe, Disley, Chester, and J. Cheetham, Oldham—Imp. in self-acting mules for spinning cotton and other fibrous materials.

Dated 19th June, 1863.

1534. S. Middleton, Newtown cottage, Hants, near Newbury, Berks. , Imp. in the manufacture of iron or other metal shoes, and in the method of securing the same to the hoofs of horses and other animals without nails.

Dated 20th June, 1863.

1548. P. Fassio, 1, Rue des Orangers, Nismes—A new method of connecting several fire places with one chimney.

1560. J. Booth, jun, Halifax—Imp. in winding machines.

Dated 24th June, 1863.

1590. T. Redwood, Summerfield Works, Lower Homerton—Improved apparatus for straining or for mixing and straining liquid and solid substances.

Dated 25th June, 1863.

1600. T. Page, Adelphi-terrace—Imp. in horse shoes and in their fastenings.

1602. R. Mushet, Coleford—Imp. in the manufacture of iron and steel.

1604. H. G. Craig, Passage West, Cork—Imp. in machinery for manufacturing or preparing iron and other metal plates for shipbuilding and other purposes.

1606. A. Watson, King-street—An improved fastening.

Dated 26th June, 1863.

1680. A. Tulpin, Manchester—Imp. in machinery for stretching and drying fabrics. (A com.)

1610. G. Boccius, Henrietta-street—An improved composition suitable for the manufacture of candles and other like articles, and of pomatum, and an improved wick for burning with such composition.

1612. J. Griffiths, Derby—Imp. in machinery for puddling iron and steel.

Dated 27th June, 1863.

1616. W. Bradshaw and J. Bradshaw, Blackburn—Imp. in looms for weaving.

1618. J. Chatterton, Highbury—Imp. in lining iron and other hollow vessels, and in manufacturing corrugated tubes of plastic materials.

Dated 29th June, 1863.

1620. W. Andrews, 237, Gresham-house, Old Broad street—Imp. in apparatus for insulating telegraph wires.

1622. L. E. Hicks, New York—An imp. in inkstands.

Dated 30th June, 1863.

1624. L. F. A. B. Marulaz, Gueret Creuse, France—Imp. in the manufacture of combs.

1626. J. Simpson, Darlaston, Staffordshire—Certain imp. in iron hurdles and fencing.

1628. A. K. Richards, Berners-street, Oxford-street—Imp. in ordnance and fire arms, and in projectiles to be used therewith.

1630. A. Silvester, Clapham-road, Surrey—Imp. in apparatus to be used in the exhibition of dramatic and other like performances.

Dated 1st July, 1863.

1634. T. Alliston, 237, Euston-road, and R. Swift, 2, Hardy-terrace, Hounslow—An improved mode of and apparatus for manufacturing metallic joints for bedsteads, and the application of such joints to certain parts of bedsteads.

1638. R. C. Clapham, Walker, Northumberland—Imp. in the manufacture of hyposulphite of soda, sulphite of soda, and sulphite of lime

1640. J. Harvey and J. S. Harvey, Hanover-square, Newcastle-on-Tyne—Imp. in machinery for cutting tobacco into cakes suitable for the press.

1642. H. Hutchinson, 26, Rue Notre Dame des Victoires, Paris—Imp. in boots and shoes.

1644. J. Cole and J. Cole, jun., Coventry—Imp. in looms for weaving.

Dated 2nd July, 1863.

1650. F. Ransome, Ipswich, Suffolk—Imp. in coating and preserving iron ships or vessels, or iron used for other purposes.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1643. G. T. Bousfield, Loughborough-park, Brixton—A new and useful machine for preparing cotton, wool, and other fibrous material. (A com.)—1st July, 1863.

1667. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—An improved machine constructed on self-moving principles for obtaining motive-power. (A com.)—4th July, 1863.

1668. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in the manufacture of telegraphic wires, and in the apparatus connected therewith. (A com.)—4th July, 1863.

1690. G. P. Reed, Massachusetts, U.S.—Certain new and useful improvements in watches or timekeepers.—7th July, 1863.

PATENTS SEALED.

[*From Gazette, July 10th*, 1863.]

July 10th.

106. C. H. Townsend and J. Young.
107. R. A. Brooman.
118. J. S. Butler.
129. E. Howes.
130. T. C. Barraclough.
132. J. Harrop.
134. R. Ferrier.
140. A. Prince.
141. W. E. Newton.
152. I. Ashe.
202. N. Wood and J. Stockley.
259. E. G. Muntz.
292. F. G. Grice.
391. J. Grantham.
682. C. T. Lutwyche and A. Lutwyche.
741. G. H. Smith.
1090. E. Mitchell.

[*From Gazette, July 14th*, 1863.]

July 20th.

131. T. C. Barraclough.
133. G. Graham and J. McLeod.
137. J. P. Bath.
139. J. W. Child.
143. R. A. Brooman.
150. J. Edwards.
157. E. Sabel.
164. J. J. Lundy.
185. W. Clark.
187. E. Bazin.
189. Sir C. Linsday.
230. A. L. Lietout and J. B. Roisin.
314. G. T. Bousfield.
321. J. A. Manning.
408. W. Clark.
437. D. Tassin.
457. W. Trustum.
467. W. Clark.
468. W. Clark.
485. W. H. Gauntlett.
514. W. Clark.
598. D. B. Parsons.
644. W. E. Newton.
906. S. A. Couperie.
1007. J. W. Proffitt and W. L. Duncan.
1047. H. E. Carchon and E. F. Raybaud.
1099. J. Badart.
1159. G. T. Bousfield.
1213. G. T. Bousfield.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, July 14th*, 1863.]

July 6th.

1644. R. Pollit.

July 9th.

1683. F. Ayckbourn.
1751. W. Barrett.
1795. W. E. Taylor.
1871. W. E. Newton.

July 10th.

1695. C. G. Hill.
1696. W. Allen and W. Allen.
1709. A. V. Newton.

July 11th.

1685. F. Mordan.
1834. Marquis G. C. A. d'Auxy.
1670, G. Davies.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, July 14th*, 1863.]

July 6th.

1590. A. L. S. Chenot & E. C. A. Chenot.
1616. W. B. Adams.

July 9th.

1635. J. Fowler, jun., & W. Worby.
1720. R. Richardson and J. E Billups.

July 10th.

1766. E. Lord, T. Lord, A. Lord, and W. Lord.

Journal of the Society of Arts.

FRIDAY, JULY 24, 1863.

NOTICE TO MEMBERS.

Members will see, by the Report of the General Meeting of the 17th inst., given below, that additional subscriptions for carrying out the Society's Memorial of his Royal Highness the Prince Consort, are invited. Any member desiring to subscribe, or to increase his present subscription, is requested to send a Cheque or Post-office Order, made payable to Mr. Samuel Thomas Davenport, the Financial Officer.

The following subscriptions have been received since the last announcement:—

Blanchard, Mark Henry	£1	1	0
Clark, Gordon	1	1	0
Gurdon, William	1	1	0
Hart, Charles	1	1	0
Joske, Paul	1	1	0
Mouat, Dr. Frederick John	1	1	0
Newen, George	1	1	0
Odling, Dr. William, F.R.S.	1	1	0
Sparrow, Charles E.	1	1	0
Wells, Jonah Smith	1	1	0
White, William Foster, F.R.C.S.	1	1	0

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

A General Meeting of the members of the Society was held on Friday, 17th inst., to receive a report from the Council in reference to the intended Memorial of the Prince Consort for the Society. Wm. Hawes, Esq., F.G.S., Chairman of the Council, presided.

The Secretary read the notice convening the meeting, and the following

Report of the Council.

The Council, in order to place the whole subject before the meeting, invite its attention to the former proceedings of the Society.

In March, 1862, the Society resolved there should be a fitting memorial of the Prince Consort placed in the Society's House, and the Council were requested to bring the subject before the members at a future time.

In February last the Society resolved that a subscription should be opened for a Marble Bust of His Royal Highness, and that in the event of the subscription exceeding what might be required for that purpose, the Council should report to a meeting of the members any new proposal they might desire to recommend.

A subscription, limited to one guinea from each member, was accordingly opened, and the amount subscribed up to this date is £683 4s. 6d.

The Council, during the progress of the subscription, ascertained that the cost of a Bust of His Royal Highness, executed by a sculptor of eminence, would not exceed 150 guineas; but as the amount of the subscription accumulated rapidly, the attention of the Council was directed to the consideration of the most desirable mode of applying whatever surplus there might be after providing the Bust.

During the discussion on this subject, it was suggested that the completion of the decoration of the Society's Great Room, as designed by Barry, would be the most fitting appropriation of the surplus fund. This view the Council have adopted, and they hope that it will be approved by the members.

In Barry's original design the spaces at the end of the room, where the Portraits of Lords Romney and Folkestone are now placed, were to have been filled—one with a portrait of George the Third, and the other with a group representing Queen Charlotte superintending the education of her Family at Windsor Castle. Barry did not live to complete these pictures, but his intentions were accurately recorded in his own etchings.

It is now proposed to fill the spaces intended to have been thus occupied, with two pictures executed by distinguished artists in harmony with Barry's intentions, one to represent the Prince Consort holding in his hand the Charter of Incorporation of the Exhibition of 1851, and the other—the Queen, surrounded by the Royal Family at Windsor.

The Council have ascertained that these pictures can be obtained at from 600 to 700 guineas, and they have reason to believe that the sum required to provide both the Bust and the Pictures, together about £750, will be cheerfully contributed by the members, some of whom have already offered to double their subscriptions for this purpose.

The Council recommend that the Bust be executed by Mr. Theed, and the Pictures one by Mr. Cope, R.A., and the other by Mr. Horsley, A.R.A. Should these suggestions be adopted, the Society, by thus availing itself of the sister arts of sculpture and painting, will possess not only faithful representations of the features of him whose memory is so justly dear to it, but will be enabled to record, on the one hand, his great public act as President of the Society, and, on the other, the happiness of his domestic life as the Consort of our revered Queen.

Mr. W. H. Bodkin (Assistant Judge) said he cheerfully rose to propose the adoption of the report. Perhaps he was in some degree entitled to be prominent upon this occasion, because he believed it was upon his motion that it was decided that in case of the subscription exceeding the amount required for a bust, the matter should again be brought before the Society. When the discussion took place, at a former meeting, as to the best mode of doing justice to the memory of their late President, and when it was decided that a bust of his Royal High-

ness should be placed in this room, he (Mr. Bodkin) took the liberty of suggesting that if it was found necessary, owing to the amount of the subscriptions received, to depart from that mode of applying the funds, it would be desirable to come to the members again to sanction such a variation. He believed the report just read had most fully, and he hoped satisfactorily, explained the course which was proposed to be adopted, and that it was unnecessary for him to occupy the time of the meeting by going into the details. It appeared to him a happy idea to combine with the contemplated alterations and improvements of the room the completion of the design of the great artist Barry, to whom they were so much indebted. The two proposed pictures would be, he thought, more in harmony with the works of Barry than the portraits now occupying the space on each side of the room, which rather marred the effect of the great pictures themselves. In thus completing the original design nothing could be more happy than placing in one of those spaces the portrait of the Prince Consort with the charter of the Exhibition of 1851 in his hand; and in the other that of the Queen surrounded by her family, as emblematic of the domestic felicity which she had enjoyed. He therefore had great pleasure in moving that the report be adopted.

The motion having been seconded by Mr. Atkinson,

The Chairman said, before putting the question he would express his regret that this undertaking had not been carried to completion by his worthy predecessor in the office which he how had the honour to fill. Sir Thomas Phillips had presided over several meetings in which this question was discussed, and had personally taken many steps with regard to it. He (the Chairman) had therefore to ask the meeting to receive from him the completion of the plan to which Sir Thomas Phillips so much contributed.

The report was then unanimously adopted and the meeting terminated.

ON JAPANESE ART.

The following is the substance of a Paper read by Mr. John Leighton, F.S.A., before the Royal Institution:—

Of all the marvels of Art and Industry collected at the International Exhibition in 1862, none excited greater attention or admiration from the reflective visitor than the contributions of Asia, including as they did the productions of India, Turkey, China, and Japan, and also of a host of islands—the inhabitants of which seem alike gifted with Art powers, indigenous to the soil on which they grow, as the gorgeous plants of the tropics flourish independently of care or culture; I allude particularly to that marvellous perception of form and colour, founded upon the laws of nature, and demonstrable by the aid of Science or the rules of Art, that seems the heritage of all Asiatics.

To the Dutch we are much indebted for keeping alight the feeble flame, the spark of European intercourse, that has never been allowed to die out, greatly to the benefit of all. Through this channel many things reached the court of the Tycoon, as others found their way *viâ* the Netherlands, into Europe; yet the Hollander seems to have profited little by the æsthetic lessons of Japan. The *Cabinet Royal de Curiosités*, at the Hague, though a great source of attraction to strangers, is certainly not so interesting or instructive as it might be made—scarcely rivalling the *Musée Siebold* at Leyden. In matters of applied art the Dutch have not a refined taste; they have a good school of *genre* in painting, though none of either architecture or ornament.

In contrasting the arts of China and Japan, what strikes one forcibly is the marked difference of labour—the Japanese aiming to produce the greatest possible effect by the least expenditure of trouble, whilst the Chinese make pains the principal virtue; they toil and spin, but lack inventive power, working from instinct rather than from the dictates of reason—a fault with all Asiatics, in greater or lesser degree.

The Japanese Court in the International Exhibition, though somewhat crowded, was beautifully arranged by Sir Rutherford Alcock, to whom we are indebted for the collection of objects, as also for those admirable volumes, "The Capital of Tycoon;" would that our envoys in remote corners of the world had done likewise, for I feel sure that in the islands of Formosa, Java, and Ceylon, are an infinity of objects of the rarest interest to Europeans.

The people of Japan, whilst they seek safety in seclusion, seem by no means to be blind to outward influence—to learning from any source. With all their love of feudalism and seclusion, the Japanese appear much more free in thought than their neighbours the Chinese, being a people who, though bound by strong tradition, are ever ready to learn, as many of their arts and manufactures clearly demonstrate. European influence is to be found in their fire-arms and ships; it has taught them linear perspective, as it will many other sciences; in fact, the horses that now shamble in shoes of straw, will gallop in iron, since Japanese chargers have been tipped with that metal, in imitation of some steeds that have found their way across the ocean.

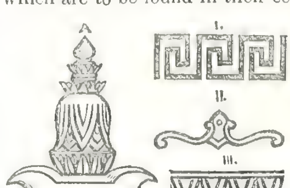
I commence with architecture, because building is the primary office of man;—construction came before decoration, though the one can hardly exist without the other; the man who constructs a deal box produces a pretty ornament, at the same time making a dove-tail—

doubly beautiful, because it grows out of the construction; thus, construction and decoration go together.

As architects the Japanese have many difficulties to contend with; they build as their fathers built—not from conservative feeling alone, like the Chinese, but because the elements are against them. Earthquakes are of frequent occurrence there, rendering a wooden construction necessary—buildings that usually hardly rise above the dignity of a plain Swiss châlet—the gable finials and ridge tiles being, perhaps, the principal features of erections rarely higher than two stories, with galleries and verandahs—the doors and divisions of rooms composed of sliding shutters—the whole edifice resting upon a foundation of stone supported upon legs of wood, somewhat as a four-post bedstead stands; this form being best suited to resist concussions caused by the trembling earth.

The temples and gateways are of timber, with massive tent-shaped roofs, like the homes of the Tartars and Chinese, but with many details purely Indian; some of the edifices, as they stand upon their stone bases, reminding one strongly of the Assyrian restorations at the Crystal Palace; indeed, it is very curious to find many types from the ancient Egyptian, Assyrian, and Greek, perpetuated in the works of these remarkable people.

In my outline A is taken from a tomb, hundreds of which are to be found in their cemeteries; a treatment of

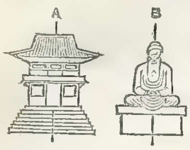


the sacred bean and lotus, so common in ancient Egypt, as also in India, the great seat of the Buddhist faith. Figs. 1 and 3 are purely classic. The Greek fret and echinus, or egg and tongue moulding are both used in China and Japan, key patterns being the most popular. Fig. 2, in which scrolls are united in a bud, is also common, though more Assyrian than either of the others. These forms, with

many beautiful renderings of the Anthemion, comprise their principal antique types.

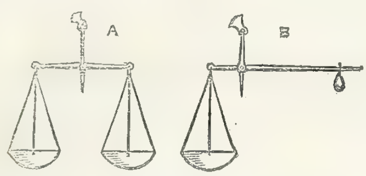
As workers in stone, the Japanese are decidedly clever; though the nature of the foundations will not permit of nine-storied pagodas, they do wonders with their material; having a timber architecture—they imitate wood in stone instead of stone in wood and plaster, as we are apt to do; even in a semicircular bridge built of stone—the struts, planks, mortices, are all formed as if they were of timber.

In their architecture and sculpture devoted to the purposes of religion, the Japanese seek the aid of symmetry



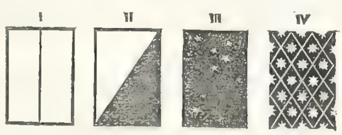
to give dignity, a majesty obtainable by no other means, a rigidity carried to the greatest extent in the works of the ancient Egyptians, though the Greeks and Romans were well aware of its powers. In ornamenting their secular objects, the Japanese seem studiously to avoid exact repetition or a counterpart of lines, or, if they find them, do all they can by means of decoration to destroy an exact division or repetition of any portion. All other nations seek symmetry on principle, save these people and the Chinese, though the latter in lesser degree.

By way of illustration, I may say they shun an equality



of parts, or rather the appearance of an equality of parts, weighing with the steelyard B instead of the scales A. Justice with them is not even-handed; and, though they give weight in another way, they do not do so by diametrical division. Division, or repetition of parts, has been considered the acme of architectural and ornamental art, though not so of pictorial art, which must be more varied, and is, save in exceptional cases, where the high position or centre is appropriate to a deity or hero; in such the pictorial is subservient to the decorative.

Diametrical division the Japanese dislike. Fig. 1 has



not variety enough for them; they do all they can to get rid of a vacuum, as in Fig. 2, following the precedent of nature, who never repeats herself either in spangling the skies with stars or the earth with daisies of the field, as in Fig. 3. Diapers and conventionalized forms, as in Fig. 4, are not so popular with them as with us, who appreciate their value to break up surfaces and lead the eye to measure distances.

The arts of Japan may be said, in an eminent degree, to depend upon the picturesque, though rarely to reach the pictorial, that is to say, they never produce a picture, because the principal element of pictorial art is wanting; light and shade—a cloak with us that covers a multitude of sins—they know not of. Art of the highest kind may, and often does, exist without chiaroscuro; for instance, the divine compositions of Flaxman owe none of their world-wide fame to shade or colour. In their works may be observed the effects of light and dark, somewhat akin to that of chiaroscuro, rendered with much truth to nature, and a dignified simplicity that many of our artists would find it difficult to imitate.

In Japan we are told there are no academies of art, nor have the artists any status above that of the cunning craftsman; a hopeful thing, perhaps, for the future—nature's students standing the less chance of being fêted, lionized, or spoiled.

For powers of drawing, native examples vary greatly, though all are deeply interesting to the art-student, who may learn from the humblest specimens. The larger

coloured examples are very remarkable for a certain typical rendering of the human face divine, not to be found in smaller engravings or in nature, a droll sort of leer pervading all with an Egyptian uniformity; though, unlike the ancient examples from that nation, perspective has taught the Japanese artist to draw faces in three-quarter view, and so vain does he appear of the power as rarely to deviate from it. Apart from defective drawing of heads, hands, and feet, the examples are very interesting, showing much good proportion, action, and drawing of drapery; whilst in colour they are very suggestive, some of the hues and patterns being handsome in the extreme.

The landscapes are very quaint, aërial perspective seeming beyond their powers, except in one or two cases where white mists have been attempted, as also rain, fog, and snow. In depicting clouds the Japanese artist seems sorely puzzled—the tinted ribbons they stretch across the heavens looking like labels for inscriptions rather than floating vapours.

The smaller samples, cut from their books, are full of

A, C, and D are from the smaller works; B, a typical mouth, from the larger.

fun and first-rate drawing, being quite equal in spirit to anything done here at the present day; aye, and done with few lines and marvellously little effort. Many of them have been engraved in Sir Rutherford's recent work; the larger efforts in colours show what the Japanese think of us and our ladies, crinoline of the amplest being faithfully depicted, as also beards, chimney-pot hats, and other peculiarities of the Western race. One of a lady in wide hoops, mounted on the wrong side of a native charger, is inexpressibly droll, showing what we may expect to behold if ever that sketch-book, so freely used last season by a member of the two-sworded embassy, should be published. Then shall we see London society as others see us, though I give the preference to native art on native subjects, particularly where there is action; for, curiously, some of the best are figures in movement—porters lifting, balancing, and carrying their loads; an acrobat poising his companion, a juggler; street-boys full of mischief, or weeping over broken dishes; mechanics at work; ladies bathing; and indeed a hundred-and-one phases of social and animal life. The lower portion of the creation are finely rendered, particularly birds in flight, ducks, geese, and cranes being hit off with wonderful precision by no ordinary marksman.

In composition they are good, two or more figures uniting in the production of admirable lines; though, like the early artists of other nations, the Japanese make their point of sight very high, all figures being as if looked down upon.

In colour, as a nation, they are very judicious, rarely producing discords, either in their attempts at picture-making or applied art—a thing that can hardly be said of either English or French. The British manufacturers, traders, and people in general, have but little love of co-

lour, though her painters and architects appreciate it highly. In France this is *au contraire*—her manufacturers and traders claim colour as an inheritance, but her painters disregard it, or place it as a minor accomplishment, the French school being one of form rather than colour.

Without attempting to solve this seeming paradox, I would here make note of another, and ask how it is fine styles of architecture and ornament seem, with the exception of ancient Greek art, never to have flourished with a perfect knowledge of drawing the human figure. With the revival of painting in Italy, purity of taste in matters of design died out. We know that Raphael painted the Loggia of the Vatican, but of what monstrosities and incongruities is it not composed. I just mention this by the way, as a warning against the Renaissance, and particularly the French version of it, that finds favour in certain quarters, to the exclusion of better things, whilst in India, Turkey, and Japan, we have an inexhaustible well of art, pure and undefiled, most eloquent in its teachings—an art that was appreciated by the great masters of mediæval times, all styles bearing evidence of the eastern forms and colours brought overland by the Pilgrims of the Cross.

With the spread of the Reformed religion, colour and design died out, being voted pagan and popish, antique figure-drawing and classic conceits taking their place, until light, shade, and pictorial effect reached its zenith in Rembrandt—the great genius of Holland—where black and white have triumphed over colour, form, and design. I think we may say that conventional art, including architecture and sculpture, was never lower than when the great school of *genre* and imitative art flourished.

In the East colour reaches its climax, as it tans the skin and renders man fit to support primitive hues, the love of which perhaps is to be found most highly in the negro, though in the Hindoo must be sought the subtle appreciation of it. Leslie has somewhere said, the only perfect specimen of colour he had seen was in a Chinese picture. What he would have said to these of Japan we can only conjecture,—colour with perspective, and shade nowhere.

We now come to sculpture, of which there is little evidence to show, though the Japanese are cunning carvers in stone, modellers, and metal workers, having a veritable passion for relief in everything; even their painted lacquer boxes are raised, the animals being very faithfully depicted, showing how they catch the salient peculiarities of nature in every case, be it in the beautiful miniature carving of an egg-shell (containing figures that must have been sculptured through the broken chinks), or a draught-ox reposing, the way the animal's legs are doubled up and disposed of being quite a study. Space being limited, I must content myself with mentioning the poetical combination of the whole animal kingdom in a dragon-vase, upon which the monster is wreathing in and out of thunder-clouds, a bolt in either claw. I do not hesitate to say that had this piece of poetry in bronze been worked on a grand scale, and placed on a pedestal, it would have found worshippers even here, so largely and grandly is it treated. This I can hardly say of a very large figure idol, of which I have seen a very small photograph. The proportions were good and pleasing, a calm serenity pervading the whole, without that combination of monstrous elements so common in Indian deities, to which it bore some resemblance.

Having disposed of the higher elements of genius in Japan, we now come to those phases of applied art by which a people become known to the future historian of art.

In art applied to manufactures, the Japanese stand very high, their versatility of thought being remarkable; rarely repeating anything by rule of thumb, or copying without some modifications. How different to the Chinese, where a tailor will reproduce a garment for you stitch by stitch, patches included; or where porcelain makers copy china vases, cracks, rivets and all. In their manufactures they studiously avoid symmetry (as I said before), and aim to condense the greatest variety in the smallest space, and, whilst they conventionalise, worship nature to the utmost some of their ways being marvellously droll to us. This I will illustrate in the decoration of a very common box brought me by Sir R. Alcock. The lid of the article being square offended the Japanese eye, as it would any other eye properly constituted; decoration being sought, a line is drawn across the article, not horizontally or vertically, as any other nation would have done, but diagonally, because it produced the greatest variety at the

cheapest rate; the box being parti-coloured, the smooth surface of the lacquer is again broken up with irregular stamps, disposed in the most irregular manner (as in B). These devices I have contrasted with figures from India (A), showing how types begin to differ; forms that are in Japan lop-sided, become in India more symmetrical, and in Europe quite so.

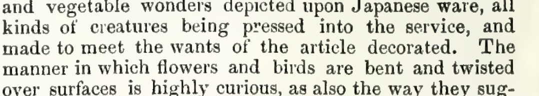
Here, again, a book-cover, stamped, shows the same principle, being covered all over with representations of coins, relieved here and there by a dab of gold and a sprinkling of the like metal.

Volcanic eruptions and grand storms, doubtless, have had much to do with the perfecting that terrible myth the dragon, which is finely rendered, as are most of the animal and vegetable wonders depicted upon Japanese ware, all kinds of creatures being pressed into the service, and made to meet the wants of the article decorated. The manner in which flowers and birds are bent and twisted over surfaces is highly curious, as also the way they suggest ideas for shapes—sometimes so true to nature as to make one wonder at the draughtsman's skill, whilst in others so highly conventionalised are they as to make one doubt the authority. Hawthorn, bamboo, and rush are very common, as also cranes and tortoises, and landscapes touched in golden outlines.

Pattern upon pattern, and form upon form, are by no means uncommon in eastern art, but the way circular patches are placed upon frets and grounds is, I think, peculiar to China and Japan.

Small round ornaments are very popular in Japan, doubtless from the resemblance they bear to the crests or badges of Daimios—forms defended by law; hence their popularity amongst the people in general, as at home lions rampant and dragons displayed may be bought of every stationer.

It is curious that all these badges (Figs. A, B, C, D, E), or nearly all, should be derived from floral ornaments, Japanese heralds being guided by some principle—for in a first book for children, I find a popular badge in its con-



ventional form with the plant it is derived from, E. A red sun, or rather a red ball, as we should call it, is the emblem of the empire of Japan, also to be seen in the book, and upon an official document sent to the British legation at Yeddo, which shows, likewise, the insignia or crests borne by the Yakoneens or retainers of Daimios—guards in charge of our ministers to the court of the Tycoon.

As engravers upon wood and metal, the Chinese are known to have been skilled long before civilisation had dawned upon England, or even Europe had dreamed of tomes in black letter; but few, a year ago, would have ventured, I think, to claim the priority of colour-printing for Japan, yet this may be the case, for in no instance do

their specimens bear evidence of having been copied from anything done in the western world, being hand proofs, worked in flat tints, without a press, secondaries or tertiaries in very few instances being produced by working colour upon colour, as with us, who use no outline to indicate form.

Truly may we say there is nothing new under the sun, and particularly under the red sun of Japan, for here we have two recent inventions superseded, one being graduated or rainbow-printing, and the other some method by which blocks or prints can be reduced.

If the printing excites our wonder, what shall we say to the paper, for certainly we have nothing like that article, which plays so important a part in Japanese life, serving a hundred purposes unknown to us, keeping out the wind and weather from man and mansion, the windows and coats alike being made of that substance, which bears little resemblance to the rag papers of other parts—our own included. We import materials for paper manufacture from Japan, but not such as a native would use; the bark of the paper mulberry being much tougher than refuse rags, he wisely retains the former but vends the latter. The toughness and pliability of paper from Japan are surprising, especially in the thinner sorts, as, when held up to the light, it appears full of holes, the woolly fibre of which it is composed being distinctly seen. It is very light and absorbent, printers' ink penetrating the fabric, which, from that cause, has to be made double when bound up in a volume. How unlike our straw paper, so unpleasantly brittle, and disagreeably dirty when printed upon, ink merely lying on the surface; making one despair of seeing straw paper take the place of the finest Morocco leather, like the wonderful samples shown in the Exhibition of 1862, or do duty for the most delicate cambric, in the shape of pocket handkerchiefs, as paper does in Niphon.

I would warn collectors of articles from Japan to be careful in the selection of objects—where all are quaint and curious, quality sometimes escapes observation. I regret that we have no collection of the best products of this remarkable people, not a cabinet of curiosities alone, but a gathering of the ordinary articles of the country, selected by some men of judgment and taste, acquainted with our wants, who could explain things and their uses. A knowledge of the ingenious aids to education, books, toys, and instruments, would be most useful.

I am informed by Sir Rutherford Alcock, to whom I am indebted for many facts, that a really good collection of works, illustrating the arts and industry of Japan, could be obtained for £1,000.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Thirty-third Meeting of the British Association for the Advancement of Science will commence in Newcastle-upon-Tyne, on Wednesday, the 26th of August, 1863, under the direction of the following officers:—President:—Sir Wm. G. Armstrong, F.R.S. Vice-Presidents: —Sir Walter Trevelyan, Bart.; Sir Charles Lyell, LL.D., D.C.L., F.R.S., F.G.S.; Hugh Taylor, Esq.; Isaac Lowthian Bell, Esq.; Nicholas Wood, Esq.; the Rev. Temple Chevallier, B.D., F.R.A.S.; Wm. Fairbairn, Esq., LL.D., F.R.S. General Secretaries:—William Hopkins, Esq., M.A., F.R.S., St. Peter's College, Cambridge; John Phillips, Esq., M.A., LL.D., F.R.S., Professor of Geology in the University of Oxford, Museum House, Oxford. Assistant General Secretary:—George Griffith, Esq., M.A., Deputy Professor of Experimental Philosophy in the University of Oxford, Jesus College, Oxford. General Treasurer:—William Spottiswoode, Esq., M.A., F.R.S., F.G.S., F.R.A.S., &c., 19, Chester-street, Belgrave square, London, S.W. Local Secretaries for the Meeting at Newcastle-upon-Tyne:—Captain Noble, Augustus H. Hunt, Esq., and R. C. Clapham, Esq., 5, Grey-street. Local Treasurer for the Meeting at Newcastle-upon-Tyne:—Thomas Hodgkin, Esq.

The General Committee will meet on Wednesday, the 26th of August, at one p.m., for the election of sectional officers, and the despatch of business usually brought before that body. On this occasion there will be presented the report of the Council, embodying their proceedings during the past year. The general committee will meet afterwards by adjournment.

The first general meeting will be held on Wednesday, the 26th of August, at 8 p.m., when the President will deliver an address; the concluding meeting on Wednesday the 2nd of September, at 3 p.m., when the Association will be adjourned to its next place of meeting.

At two evening meetings, which will take place at 8 p.m., discourses on certain branches of science will be delivered.

There will also be other evening meetings, at which opportunity will be afforded for general conversation among the members.

The Committees of Sections will meet daily, from Thursday, the 27th of August, to Wednesday, the 2nd of September inclusive, at 10 a.m. precisely.

The Sections will meet daily, from Thursday, the 27th of August, to Tuesday, the 1st of September inclusive, at 11 a.m. precisely.

The following are the titles of the sections to which communications may be presented:—Section A. Mathematics and Physics. B. Chemistry and Mineralogy, including their applications to Agriculture and the Arts. C. Geology. D. Zoology and Botany, including Physiology, Sub Section D. E. Geography and Ethnology. F. Economic Science and Statistics. G. Mechanical Science.

Notices of communications intended to be read to the Association, accompanied by a statement whether the author will be present or not at the meeting, may be addressed to George Griffith, Esq., M.A., Assistant General Secretary, Jesus College, Oxford; or to Captain Noble, Augustus H. Hunt, Esq., and R. C. Clapham, Esq., Newcastle-upon-Tyne.

HAMBURGH INTERNATIONAL AGRICULTURAL SHOW.

This show, which was held recently, may be regarded as the most important Agricultural Show that has ever been held on the Continent; not forgetting the great shows held in Paris, because the German show, while quite equal in elegance of detail, was much more real in its character, being more largely supported by agricultural purchasers of both stock and implements.

German noblemen and gentlemen, owners and cultivators of estates numbered in thousands of acres, appeared there both as exhibitors of improved stock in almost every class, and as purchasers of the most expensive of modern agricultural machines. Hamburgh has no direct agricultural interest, but although encircled by a series of foreign custom-houses raised to tax, for Denmark or the Zollverein, the articles which come free into the "Free City," it is nevertheless one of the great ports of Northern Germany, a sort of great bonded warehouse, in which enormous supplies are first lodged before being distributed by the net-work of railways branching through Prussia and Austria. The merchants, where not directly interested as landowners, have close relations with landowners—their customers in many shapes. Hamburgh has also a close and constant connection with England, through London and Hull. The great trade that has grown up in cattle and sheep from the neighbouring state, Denmark, as well as Northern Germany, has every year more and more impressed the graziers of these districts with the necessity of adding quantity and quality to their stock by English crosses. It was under these circumstances that a few Hamburgh gentlemen, headed by Baron Martens, who died suddenly before his great idea had been realised, determined to take advantage of the position and traditions of Hamburgh, and hold an International

Exhibition, which should rival in importance the great fairs of the Middle Ages. For this purpose they raised, and most liberally spent, several thousand pounds. The undertaking must be interesting to Englishmen, because it derived no support from the Government treasury, but was, like our own most successful undertakings, entirely dependent upon private enterprise and voluntary contributions; and it was held in a city where all importations from every country are absolutely free.

From the moment the show was determined on the committee placed themselves, through Professor Wilson, in communication with the Royal Agricultural Society, and obtained all the results of the experience of English shows.

The showyard stood just outside the town, on a sort of turf common, and covered about 30 acres. At every shed was a spar, from which floated the flags and signals of every nation and city in the world. On each side of the entrance walls the poultry were arranged—not a very remarkable display; and next, on each side, three booths for agricultural produce. The archway was flanked by two arcades, under which fruit, and flowers, and vegetables were arranged. A small oval piece of ground between the arcades had been turned into a terrace garden, with a fountain, banks of green turf, and beds of flowering plants. Six sheds, three on each side of the entrance, were devoted to raw produce—wool, grain, wine, oil, beeswax, tobacco, cheese, butter, hemp, and flax, and silk, and all kinds of preserved fruits. The collection of merino wool was very fine. There were also models of rooms for silkworms, with cocoons hanging from a framework in mathematical regularity, a very curious and pleasing sight.

The live stock were arranged in parallel rows or streets, under capital sheds, with water laid on at each end; the sheep to the left and the pigs to the right of the entrance garden. Then came a broad street, with an orchestra dividing it, and on the opposite side the sheds containing the horned stock. The horses, a noble collection, were arranged in capital boxes, solid enough to have been permanent, with blinds to shade from wind and rain, in a half circus, or horse-shoe shape, with a large ring of grass for trial and exhibitions. The pigs were nearly all of English breed, or pure English crosses; white and black seemed in nearly equal favour. All the best English pigs were sold, and at great prices.

In sheep, the exhibition of Merinos was very numerous and fine. It included a pen from Vermont, in the United States. Valuable as merinos are, the constantly increasing demand for mutton is bringing our English breeds into well-deserved favour, Southdowns and Cotswolds having the preference. The cross of the Merino with the Cotswold is a favourite one. Southdowns were the best represented on this occasion. There were some pretty specimens of the Sussex Southdowns from the Duke of Richmond's flock, which were all readily sold at good prices. The German cattle salesmen supported the Hamburgh Show in a most spirited manner, sending over some of the very choicest specimens of our choicest breeds, which they purchased for the occasion. Leicesters and Lincolns, with enormous fleeces, and Cotswolds, Oxford Downs, and Shropshire Downs, with some small, black-faced Scotch sheep, gave a pretty good idea of the variety of breeds required by the soil and climate of Great Britain.

In the show-yard there were the long lines of wooden sheds for the live stock, and the long lines of implements with the familiar sign-boards of Howard and Ransomes, Bentall and Garrett, Barrett and Andrews, Samuelson and others, so well known in England. The Americans were also well represented. There were steam engines and threshing machines by Clayton and Shuttleworth and others. The traction machines excited much interest and surprise.

It will be remembered by those who visited the Paris shows, that our larger classes of implements were seriously examined by very few Frenchmen, for the obvious reason that large farms are quite the exception in France. But at Hamburgh, landowners from Holstein, Mecklenburgh, and Denmark, from Silesia, Wurtemburg, and Bavaria, and from the German provinces of Austria, were attentive observers, and not inconsiderable purchasers, in spite of the enormous load of duties imposed by those countries.

In the corn-growing districts of the Continent, from north to south, one or more steam-driven threshing machines have become indispensable on every estate, in order to take advantage of distant corn-markets. Many a foreign nobleman, who formerly grew a few acres of corn for local consumption, now, stimulated by railroad conveyance, grows hundreds of acres, which all the men in the district could not thresh in time for market.

The confidence displayed by foreigners in British workmanship and British integrity was most remarkable, and was shown by the readiness with which purchases were made. The trials of Burgess and Key's, Samuelson's, Wood's, and M'Cormick's reaping machines were followed with much interest; although the season was rather late for purchases. The same reason still more interfered with the hay-making implements. A fair business was done in ploughs, harrows, chaff-cutters, and turnip-slicers. Howard's horse-ploughs seemed as well known at Hamburgh as at home.

The foreign de of the implement yard contained nothing of an agricultural kind except copies of English machines and tools of very inferior workmanship. The centre of attraction on the German side was a building of artificial stone, in which stood an artificial horse, on which, from time to time an exhibition of trotting in the German style was given.

Amongst the firms exhibiting was Mr. Garrett, a son of the well-known head of the firm at Leiston, who has established a factory at Magdeburg, in Prussia, and makes every kind of English implement and machine in demand. The Germans appear to estimate the value of machinery as follows:—First, if they can afford the price, they prefer an English machine; next, a machine from the factory of an Englishman settled in Germany; and last, the productions of their own countrymen, who apparently can copy, but cannot fit. This is very curious, because the more you talk to the German workmen and mechanical labourers, the more you are struck with their superiority over our men in literary and theoretical education. All the workmen seem to have some scientific knowledge. They can most of them draw a sketch by way of explanation, and yet they cannot do what the Japanese do in perfection—make a good fit and fine finish to their work.

The Prussian duties on agricultural implements are oppressively high, but the Russian Government, more enlightened, has reduced the duty on that class of machinery to a merely nominal rate, while in the principalities of Wallachia and Moldavia there are no duties at all on agricultural machinery. The consequence is that the landowners, having this threshing power in their hands, sow whole square miles of wheat, thresh off in the field, burn the straw, and send the corn in home-made carts, which never return, drawn by home-grown ponies, hundreds of miles—some of them have as many as ten sets of threshing machines and steam engines—away to the Danube. These same boyards, or princes, are now going into reaping machines, and some of them will, no doubt, take up steam cultivation.

In cattle, the prizes were for Shorthorns and for Ayrshires, and for English and Scotch breed being neither Shorthorn nor Ayrshire. Mr. Crisp took the first prize for the best aged Shorthorn bull, and the best Shorthorned heifer, and the second prize for heifers. Mr. Honke, of the Metropolitan Market, took the first prize with First Fruits, with which when a calf the late lamented Jonas Webb carried off the gold medal as the best bull in the yard. There were no Devons shown, although there is a Danish breed of small red cattle which would certainly breed and improve with a cross of Devon bulls. Some black-polled Scotch cattle carried off prizes, and were much admired by the foreigners. In thoroughbred stal-

lions suitable for improving the breed of well-bred horses for various purposes, there were 17 entries, eight being the property of English exhibitors. The first prize went to Vortex, the second to Harleston.

The class for Arabian stallions brought 16 entries, some very beautiful animals. The prize went to one 29 years old, which for years had been daily carrying a man of seventeen stone, on the ground that he was the very highest type of Arab. The King of Wurtemburg also sent a pair of very beautiful mares, one a flea-bitten gray, pronounced by competent English judges to be perfect. Out of 217 stallions, 33 were exhibited by Englishmen, and 29 mares out of 274, but a very large number of the foreign entries were of pure English blood. Altogether, the show of stallions, except thoroughbreds, was better than any ever made at the English shows. Many of the Mecklenburghers were magnificent. Mr. Holmes, of Beverley, took a prize for a hunting mare, and sold her to a Hamburgh merchant.

The carthorses were very good. Mr. Crisp took three prizes for Suffolks, the first and second for the best horse for agricultural purposes, for the best hunting mare, and a second prize for a pony. It was understood that the Clydesdales from Windsor took a prize. Nearly £400 was taken at 3s. a head to see the steam ploughing. Three of Fowler's sets were in the field, one worked by Fowler, the other two by Ransomes and Richardson, and Garrett had one of Howard's system in operation. The ground was a piece of old tough grass with a subsoil of morass beneath. As a trial it was absurd, for there was not above an acre each. Under these circumstances it is enough to say more than that the work was well done by Fowler's sets. Howard's plough received some serious injury on the journey from England, which when set to work so increased that it would not steer in one direction, and competition was out of the question. However, Mr. Sutton, Messrs. Howard's representative, worked on with great energy under this most discouraging circumstance, and was rewarded by a medal "for the system." Fowler obtained the first prize and the gold medal, and Ransomes one for their application of Fowler's system. This firm also obtained a medal for their collection. Out of ten gold medals five or six went to the English exhibitors; one to Clayton and Shuttleworth for their combined steam driven barn machinery; two, as before observed, for steam cultivation. There was a trial of reaping machines, in which Samuelson, Burgess and Key, and Wood took part.

The English judges were Professor Wilson, Mr. Wetherby, Mr. Robert Smith, and Mr. Barthrop.

The accompanying statement, translated from the catalogue, will give an excellent idea of the importance of the show, and of the relative position of our countrymen. It will be seen that our implement exhibitors numbered one-fifth, and our live stock one-sixth of the total numbers entered, and certainly we obtained a fair share of prizes. In pigs, for instance, Mr. Crisp, who carried off 17 prizes in all, had four first and two second prizes for his own black breed and for Berkshires. Mr. Sexton, besides prizes for Cotswolds, had four prizes for young black and young white boars and sows. Mr. Fisher, representing Mr. Wainman, carried off three first and three second prizes for his large white and middle-sized breeds, and sold off all the stock he had to sell at high prices. The other two gentlemen made great sales. In sheep, Mr. Wood, representing Lord Walsingham, besides carrying off the South Down prizes, sold all the sheep he had for sale, one ram at a hundred guineas. Lord Kinnaird took a first, and Mr. Gebhart, of London, a second prize for Scotch polled stock; Mr. Guerrier, of the Metropolitan Market, the prize in the class for crosses of Downs with an Oxford Down. Mr. Fowler took the prize for Alderneys, which, however, did not set at all, the climate not suiting. The Cotswolds were also sold. The Lincoln sheep did not seem to take.

The following is the number of entries from different states:—From Anhalt—3 rams. Brunswick—3 bulls, 4 cows, 5 heifers, 13 rams, 14 ewes, 3 wethers, 1 boar, 8 sows. Denmark—1 stallion, 1 mare, 4 bulls, 1 cow, 2 heifers, 3 rams, 3 ewes. The Duchies—24 stallions, 16 mares, 2 Galloways and ponies, 37 bulls, 66 cows, 72 heifers, 43 rams, 77 ewes, 4 boars, 6 sows, 4 young pigs. France—6 stallions, 1 cow, 17 rams, 48 ewes. Great Britain—33 stallions, 29 mares, 5 Galloways and ponies, 63 bulls, 25 cows, 44 heifers, 135 rams, 265 ewes, 25 boars, 34 sows, 30 young pigs. Hamburgh—32 stallions, 48 mares, 6 Galloways and ponies, 24 bulls, 30 cows, 31 heifers, 35 rams, 81 ewes, 14 boars, 33 sows, 10 young pigs. Hanover—52 stallions, 147 mares, 18 Galloways and ponies, 33 bulls, 135 cows, 61 heifers, 4 oxen, 55 rams, 90 ewes, 13 boars, 22 sows. Hesse Cassel—1 bull, 1 ram, 6 ewes. Lippe (Principality of), 2 stallions, 4 mares. Lubeck—1 mare. Mecklenburgh Schwerin—23 stallions, 9 mares, 7 bulls, 3 cows, 3 heifers, 22 rams, 41 ewes, 3 wethers, 3 boars, 9 sows, 12 young pigs. Mecklenburgh Strelitz—2 rams. Netherlands—4 bulls, 37 cows, 9 heifers, 2 rams, 21 ewes. Austria and Dependencies, or Crown Lands—4 stallions, 22 bulls, 24 cows, 27 heifers, 10 oxen, 88 rams, 58 ewes, 10 wethers, 2 boars, 4 sows. Oldenburg—7 stallions, 5 mares, 18 bulls, 15 cows, 25 heifers, 1 ram. Prussia—24 stallions, 10 mares, 2 Galloways and ponies, 22 bulls, 21 cows, 13 heifers, 18 oxen, 293 rams, 233 ewes, 15 boars, 18 sows, 26 young pigs. Russia—2 stallions, 2 mares. Saxony—3 bulls, 5 cows, 6 heifers, 4 oxen, 26 rams, 34 ewes, 6 wethers. Saxon Duchies—2 bulls, 2 cows, 3 heifers. Sweden and Norway—2 stallions. Switzerland—4 bulls, 9 cows, 3 heifers. Spain—1 stallion, 1 ram, 2 ewes. United States of America—3 rams, 9 ewes. Wurtemburg—4 stallions, 2 mares, 7 rams, 3 ewes.

Total numbers.—Horses: 217 stallions, 274 mares, 33 Galloways and ponies—524. Cattle: 245 bulls, 378 cows, 304 oxen, 36 heifers—965. Sheep: 750 rams, 994 ewes, 22 wethers—1,766. Pigs: 77 boars, 134 sows, 82 young pigs—293.—Total 3,548.

The numbers of exhibitors of Agricultural Implements and Machinery from different States were:—From Anhalt, 3; Baden, 1; Bavaria, 2; Belgium, 1; Brunswick, 4; Denmark, 3; the Duchies, 21; France, 10; Great Britain, 73; Hamburgh, 61; Hanover, 46; Hesse Cassel, 1; Hesse Darmstadt, 2; Lubeck, 1; Mecklenburgh Schwerin, 15; Mecklenburgh Strelitz, 1; Netherlands, 3; Austria and Dependencies, 17; Oldenburg, 1; Prussia, 52; Saxony, 7; Saxon Duchies, 2; Sweden and Norway, 12; Switzerland, 1; United States of America, 6; Wurtemburg, 4.—Total 350. Machinery and Implements 2,941.

MANUFACTURE OF SALT IN TURKS ISLANDS.

The following communication, with enclosures, has been received from the Secretary of State for the Colonies:—

Downing-street, 13th June, 1863.

Sir,—I am directed by the Duke of Newcastle to transmit to you, for the information of the Council of the Society of Arts, the copy of a despatch from the Lieutenant-Governor of Jamaica, with one from the President of the Turks Islands, furnishing details upon the manufacture of salt as practised in that colony. His Grace desires me to state that these papers are communicated to the Society of Arts in case they should have any information to give to the President, or any means of promoting the inventions sought for. I am, Sir,

Your obedient servant,

C. FORTESCUE.

P. Le Neve Foster, Esq., M.A.,
Society of Arts, Adelphi.

[Enclosures.]

King's House, Jamaica, March 9th, 1863.

My Lord Duke,—With reference to your Grace's despatch, No. 182, of the 31st of December, 1862, I have

now the honour to transmit a despatch received from Mr. President Moir, furnishing such details respecting the manufacture of salt in the Turks Islands as he has been enabled to gather. I have, &c.,

(Signed) E. EYRE.

His Grace the Duke of Newcastle, K.G., &c., &c.

Government House, Grand Turk, 16th February, 1863.

Sir,—I shall now endeavour to furnish, in compliance with his grace the Secretary of State's despatch, No. 182, dated 31st December, 1862, such details respecting the manufacture of salt in this colony as I have been enabled to gather from written and oral communications since my recent arrival at Grand Turk.

2. To assist any particulars I may be enabled to give, I have the honour to enclose a tracing of this island, showing the several salines and canals, coloured blue, which will explain the position and extent of the salt ponds now under, if I may make use of the term, cultivation.

3. It is apparent from that drawing that the salines are situated at various distances from the sea, from which they all, with one exception, receive the supply of water necessary for the production of salt. That exception is the pond marked "Hawk's Nest," which is furnished with natural salt springs, which rise in the reservoir, separated from the "pans" hereafter described. The others receive a supply of water by means of canals, dug from the principal reservoirs to the sea, and which are furnished with flood gates.

4. The bottoms of these reservoirs are on about a level with low-water mark, and, when the "salt season" is about to begin, have a liberal supply of sea-water admitted to them for the purpose of "pickle" or "brine," being produced by means of the evaporating powers of heat and wind; while this process is being accomplished, and generally about the month of March, the lessees of the various salt ponds proceed to throw off into surrounding dams the rain or other water which may have collected in the "pans" during the winter, or since the last raking, by means of circular hand water fans, and "wooden rakes," so called, but in truth instruments of wood, precisely similar in shape to that made use of in England to scrape the mud from the public thoroughfares. The pans are then thoroughly cleansed of any mud and slime which may have accumulated on the bottom, and are, if the weather be fine, exposed to the sun's rays for two or three days to harden or bake. This process, and a large supply of water in the reservoirs there being gradually prepared for introduction into the pans, are most important requisites for securing a good and clean crop of salt. The extent of reservoir ought to be in the proportion of three to one of the pans attached or dependent on each reservoir.

5. During the two or three days when the pans, which are of sizes varying from one-eighth to half an acre, are being exposed, and as opportunities permit, the division banks, formed of stones and mud, are carefully repaired, and, all preliminaries having been completed, the "pickle" or "brine" from the reservoir is turned into the "pans," or, should the pans not be close enough, into narrow water-courses, leading to the more distant ones, and thence, by means of the circular water fan already referred to, into the pans, which are thus covered with brine to the depth of from eight to eighteen inches.

6. The sun and wind then do their part, and as in England it is the wish of the sportsman to hear of "a southerly wind and a cloudy sky," so in Turks Island the prayer of the salt-raker is—

"A cloudless sky,
And the wind blowing high,"

both of which contribute to the realisation of his hopes—a deposit to the depth of from one to four inches of the salt, specimens of which I shall do myself the honour of forwarding to his Grace with this despatch.

7. By the salometer the pickle commences to granulate at 96, sea-water being indicated on the scale by the number 12; and while between the higher number and 100, the remaining brine is thrown off, and what is termed "raking" then commences.

8. Should the lessee, through carelessness or from other causes, neglect to throw off this brine, and rake at the proper period, two other crystallisations would take place, viz.:—1st. Muriate of soda, or common salt; 2nd. Sulphate of soda, or Glauber's salt; 3rd. Sulphate of lime, or gypsum. Specimens of the two latter I shall endeavour to procure to forward with the other crystal.

9. The cake, of from one to four inches, formed at the bottom of the pan, having been exposed, it is broken up by means of a heavy-headed iron rake, gathered by the wooden scraper into longitudinal ridges, and conveyed in mule carts to the several places of deposit for shipment. This breaking up and raking are parts of the process which are capable of much improvement. I have now at my disposal the sum of £100, a part or the whole of which will be paid to any one who will furnish this government with the best working model of a machine or machines, suitable for breaking up and raking salt. I have great hopes that the inquiry now instituted by his Grace may be the means of attracting the inventive intelligence of machinists in Great Britain and the continent of Europe to this subject; and I need not add how grateful I should be if his Grace would cause any new feature in the manufacture of the staple of this colony, which may be elucidated in the course of this inquiry, to be communicated to your excellency for the use and benefit of the salt-rakers in these islands.

10. From two to six "crops" can thus be gathered within the six months after the middle of March, everything, however, depending on the absence of rain and the power of the sun and wind. At Cockburn Harbour, East Cairos, which is supplied by magnificent natural springs, the lessee has been so fortunate as to rake the same pans once every fortnight, for some considerable time. The average annual yield of an acre of salina is 8,000 bushels, and in the United States of America, our principal market, the salt from this colony is considered superior to any which can be procured elsewhere, and is invariably used by that Government for preserving their salted meats. The price here has varied within the last few years from three pence to four pence sterling per bushel, containing thirty-five imperial quarts.

11. This production is liable, I am told, to a "disease" which sometimes renders the labours of one or more seasons almost valueless. I suspect, from what I can collect on the subject, that the danger lies in some neglect of the formation at the bottom of the salt pond, but I am unwilling to communicate to his Grace any opinion of mine that might possibly mislead. I therefore content myself at present with sending a specimen of a healthy formation; and when I find I can write with more knowledge of this part of the subject, I shall do myself the honour of supplementing this hasty report, and if possible transmitting specimens of the unhealthy brine, or of the formation in the pans, for chemical analysis.

I am, &c.,

ALEXANDER MOIR, President.

His Excellency Lieut. Governor Eyre, &c.

THE GUARANA OF BRAZIL.

In a paper read by Mr. T. C. Archer, before the Botanical Society of Edinburgh, in April last, that gentleman furnished the following particulars respecting *Paullinia sorbilis*, Mart, and its products.

There is no more remarkable plant in the order Sapindaceæ, if regarded from an economic point of view, than *Paullinia sorbilis*, although as a plant it is not well known to the botanical world. From its large seeds is manufactured the substance called Guaraná, which is extensively used in Brazil, Guatemala, Costa Rica, and other parts of South America, as a nervous stimulant and

restorative. The seeds, deprived of their coverings, are pounded into paste, which, hardened in the sun, constitutes Guaraná. It is used both as a remedy for various diseases, and also as a material for making a most refreshing beverage; and it adds another of those incicidents so puzzling in human history, of the discovery of these qualities in plants least likely to be suspected; such, for instance, as that of the leaves of tea, the seeds of coffee and cacao, the leaves of twigs of the various American Ilexes, and other plants, should have this wonderful restorative effect on the nervous system, and that this should not be a mere vague notion, such as attaches to thousands of other plants, but that it should really depend upon the presence of a chemical principle the same in all, and the operation of which can be satisfactorily explained. The presence of an alkaloid, which he called Guaranine, was discovered some years ago in Guaraná by Dr. Theodore von Martius, of Erlangen, but its identity with Theine was soon established, and subsequent analyses, especially one by Dr. Stenhouse in 1856, proved that not only was the active principle of Guaraná identical with Theine, but that, as far as is known,no other substance yields it so abundantly, the amount being 5.07 per cent. as against tea, which yields 2·13 per cent., and coffee from 0·8 to 1·00. The mode of using the Guaraná is curious and interesting. It is carried in the pocket of almost every traveller, and with it the bony palate of the large fish (*Sudas gigas*), locally called "pirarucu," the rough surfaces of which form a rasp upon which the Guaraná is grated, and a few grains of the powder so formed are added to water, and drank as a substitute for tea. The effect is very agreeable, but as there is a large portion of tannic acid also present, it is not a good thing for weak digestions. Its remarkable restorative power has given it a further great reputation as an aphrodisiac.

Another species of this genus, *Paullinia cupana*, also enters into the composition of a favourite national diet-drink. Its seeds are mingled with cassava and water, and allowed to pass into a state of fermentation, bordering on the putrefactive, in which state it is the favourite drink of the Orinoco Indians.

The tree is abundant in the new province of Amazonas, where the seeds are collected, reduced, and prepared in mass, and sold to the Bolivians, who use it largely. It is also sent to the provinces in the South. There is exported annually from the city of Santarem, about 500 arrobos, or 16,000 lbs., valued at 8d. or 9d. per lb.

Specimens of the Guaraná were exhibited in the Brazilian Court, made by the Indians of the Amazonas, who not only prepare it for their own use, but for conveyance to Pará, Matto Grosso, and Goyaz, where it finds a ready market. It is made from the seeds of a low wide-spreading tree, which grows abundantly along the banks of the Upper Tapajós, Rio Negro, and other tributaries of the Amazonas, as well as in Guiana and Venezuela. The fruit is scarcely as large as a walnut, and contains five or six seeds; these are first roasted, then mixed with a little water, moulded into a cylindrical form the size and shape of a large sausage, and dried in an oven, in which state it is known as an article of commerce. It is grated into a powder by means of a rasp (the bone before alluded to), which was shown in the Exhibition. Two spoonfuls of this powder are mixed in a tumbler of water; this is considered to be a very refreshing drink, and regarded as a stimulant to the nerves, and, like strong tea or coffee, is said to take away the disposition to sleep. It is exported from the Rio Negro, where it has been purchased for 1d. per. lb.; in 1851, 3,500 lbs. of Guaraná was exported from Pará, which was there valued at 13d. per lb. In the Exhibition six different preparations made in Vienna, from Guaraná, were exhibited in the Austrian Court. It has been before observed that Dr. Stenhouse ascertained that it contained a quantity of a principle first called Guaranine, but which has been found to be identical with Theine, the principle to which both tea and coffee owe their invigorating qualities. The same principle, in the amount of $1\frac{1}{4}$ per cent., also exists in the Yerba Maté, the celebrated Paraguay tea, which consists of the dried leaves of some species of *Ilex.*

The powdered seeds of the *Paullinia* are said to have been employed with much success, by French medical men, in cases of headache. They furnish by analysis a small quantity of resinous matter, starch, tannin, and guaranine.

THE FRUIT TRADE.

Messrs. Adolfo Pries and Co., of Malaga, give the following report, under date of 15th ultimo:—

"We are glad to be enabled to give our this year's summer report with very favourable prospects for a good stock of fruit.

"After very dry weather during the winter months, we had it in May very fresh and humid, and the vines to-day look generally better than for many years past, especially for Muscatel raisins, as these vines have least suffered by oidium during past years, and an unusually fine crop is in prospect. There are vines around Malaga with 20 to 25 bunches of Muscatel grapes, so luxuriant as to double the produce of ordinary seasons. Old stocks of Muscatels in boxes have been shipped during the last two months at rising prices to England and North America. The remaining stocks do not exceed to-day 30,000 boxes of only ordinary fruit on layers; better sorts, as also bunch, are quite exhausted. The result of the last year's crop amounted to 1,250,000 boxes, which have been shipped as undernoted:—

	Boxes.
To the United States of North America ...	400,000
To the United Kingdom	250,000
To France	160,000
Consumption of our Interior	150,000
To South America	50,000
To Canada, California, and Melbourne ...	50,000
To Russia	15,000
To Portugal...	15,000
To Italy	12,000
To Holland and Belgium	18,000
To Germany	12,000
To Denmark, Sweden, and Norway ...	6,000
Packed in barrels, and shipped to the North of Europe and North America, equal to	80,000
Stocks on the spot	32,000
Total...	1,250,000

Against 1,500,000 boxes in the previous year; and according to the present state and prospects of this new crop, we think we are not wrong if we estimate the yield to be about two million boxes, or 25,000 tons. Moderate prices will therefore be established, especially after the first wants for early and quick shipments are covered, but for these, prices may open not so very low.

"The stocks here, as also on the principal markets of consumption, will be almost entirely exhausted by the time the new crop is ready, as in spite of the unfavourable commercial and political circumstances in the United States of North America, the consumption of our raisins is almost to be counted as one of the most necessary wants. For other sorts of Muscatels, we hope certainly to see established lower prices than in the late former years. With the large crop anticipated, selections may be made with more care for satisfying, at accessible prices, the yearly-increasing demand. The selected first qualities will be always high in price, but the better middle sorts must be purchased at less exorbitant prices than of late years.

"As to raisins in barrels, say small Muscatels, long and Garoon raisins, there is an equally good crop. The last year's export of these descriptions did not exceed 30,000

barrels. We think that about double this quantity may be exported this year.

"Figs promise a very rich result. Of what quality the crop may prove must be decided in July or August, according to the weather, but at present very moderate prices seem to be certain for this fruit.

"Almonds—both the fine long Jordan and the true Valencia and broad ones from here promise only a middling crop. There are no old stocks of Jordan almonds. We do not expect, however, for this kind, with a reduced demand, high quotations, while the Valencia and our broad fruit might be higher in price than last season."

The stock of dry fruit in the London bonded warehouses on 30th June, 1863, and on the corresponding date of the previous year, was as under, according to Messrs. Murton and Webb's statement:—

		30th June, 1862.		30th June, 1863.
Currants	tons	10,000	...	8,500
Raisins—Valencia ...	,,	650	...	14
Smyrna (red)	,,	400	...	590
Sultana ...	packages	25,244	...	25,870
Muscatel ...	,,	9,245	...	42,786
Figs—Turkey ...	,,	11,284	...	22,667
Almonds—Jordan ...	boxes	2,251	...	2,519
Prunes	barrels	98	...	375
,, ...	cases	71	...	56
Plums	,,	692	...	22
Dates	barrels	—	...	6
,, ...	cases	107	...	43
,, ...	mats	954	...	12,197

EXAMINATION PAPERS, 1863.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(Continued from page 592.)

NAVIGATION AND NAUTICAL ASTRONOMY.

THREE HOURS ALLOWED.

Only one question to be answered in each section.

I.

1. June 17, 1863, the observed meridian altitude of α Serpentis was 29° 50′ 40″ (zenith south of the star), the index error of the sextant was *plus* 4′ 20″, and the height of the eye above the sea 24 feet. Required the latitude.

2. On February 4, 1863, about 4h. 50m., A.M., mean time, in latitude 51° 20′ S., longitude 124° 10′ W., the sun bore by compass N. 84° 56′ E., and the observed altitude of the sun's lower limb at the same time was 6° 30′ 10″, the index error *plus* 1′ 15″, and the height of the eye above the sea 15 feet. Required the variation of the compass.

II.

1. September 19, 1863, in latitude by account 53° 10′ N., longitude 56° E., the following double altitude of the sun was observed:—

Mean time nearly.	Chronometer.	Observed altitude lower limb.
7h. 30m. A.M.	5h. 15m. 22s.	21° 20′ 30″
10h. 15m. ,,	8h. 0m. 31s.	37° 0′ 20″

The run of the ship in the interval was N.N.E. ½ E. 20 miles; the index error was *plus* 3′ 20″, and the height of the eye 30 feet. Required the true latitude of the place of observation.

2. August 23rd, 1863, at 9h. 40m. P.M. (mean time nearly), in latitude 30° 10′ N, and longitude by account 22° 50′ W., when a chronometer showed 11h. 4m. 20s., the observed altitude of α Pegasi east of meridian was 43° 32′ 20″, the index error was *plus* 2′ 0″, and the height of the eye above the sea was 20 feet. Required the longitude. On August 1, at noon, the chronometer was slow on Greenwich mean time 5m. 40s., and its daily rate was 3·7s. losing.

III.

1. Prove that *meridian distance* is equal to the *difference of longitude* multiplied into the *cosine of the latitude.*

2. Prove that *tan course* $= \dfrac{\textit{diff. longitude.}}{\textit{mer. diff. latitude.}}$

3. Prove that meridional parts of the sphere = log. (cos. half latitude) × M.

IV.

1. Required the compass course and distance from A to B:—

Lat. A 49° 30′ } S. Variation 2½ W. lon. A 2° 20′ E.
,, B 49° 30′ } S. Deviation 8° 50′ W. ,, B 3° 40′ W.

2. A ship sails from latitude 67° 10′ N., and longitude 10° 15′ W., S. by W. 35, N.N.W. 22, E.N.E. 17, S.S.E. 14 miles. Required the latitude and longitude arrived at.

3. A ship steams 11 knots an hour, and her apparent course is W. by S., what is her true course and distance in 4¾ hours supposing a current drifting N. ¾ E. 2½ knots an hour?

V.

1. Explain what is meant by the Polar Triangle, and demonstrate its chief properties.

2. In a right-angled spherical triangle, given the hypothenuse and one of the adjacent angles, find the other two sides.

3. State and prove Napier's Analogies.

VI.

1. What is meant by *mean time* and *sidereal time?* and show how one may be converted into the other. Ex. What is the sidereal time at a place whose longitude is 125° W. of Greenwich, on June 11, 1862, at 3h. 40m. local mean time.

2. The following errors of a chronometer, from mean solar time at noon, at each place were determined viz.:—

Port Royal, Feb. 9th, + 5h. 13m. 5·0s.
Alta Vela, Feb. 20th, + 4h. 52m. 34·5s.
Port Royal, Feb. 28th, + 5h. 13m. 44·3s.

Required the longitude of Alta Vela, the longitude of Port Royal being 78° 50′ W., the rate of chronometer being supposed to be uniform; also *state* the principal methods of finding the longitude by observations.

VII.

1. Show how to find the hour angle or meridian distance of a star from the observed altitude. How is it determined whether it is east or west of the meridian?

2. Explain the method of finding the latitude by meridian altitudes.

3. Investigate a method of clearing a lunar distance.

Ex. Apparent altitude sun's centre 23° 5′.
Apparent altitude moon's centre 49° 16′.
Apparent distance of the centres 75° 42′ 25″.
Horizontal parallax 54′ 47″.
Find the true distance.

VIII.

1. Describe the sextant, and explain the principle on which it is graduated.

2. What are the principal adjustments of the sextant? and describe the observations for the determination of the index error.

PRINCIPLES OF MECHANICS.

THREE HOURS ALLOWED.

1. What are the different kinds of force which enter into statical investigations?

2. Investigate the two conditions fulfilled by any number of forces, acting on one point in a plane, which are in equilibrium.

Two rafters of a roof (whose weights are not to be taken into account) are inclined to their tie-beam at an angle of 60° ; at their common top is suspended a weight of 10 cwt. ; find the strain of the tie-beam.

3. Prove the ratio between the power and weight of a smooth heavy body at rest on an inclined plane.

Supposing the plane to be rough, show how the ratio is altered.

What is meant by "the limiting angle of resistance" in this case?

A mass of iron weighing 500 lbs. rests on a perfectly smooth plane inclined at an angle of 30° to the horizon ; what strain must a bar in the plane sustain that prevents it sliding down?

If the plane be of oak (for which the limiting angle of resistance is 30° nearly), what force parallel to the plane will be required just to drag it up?

4. Describe the different systems of pulleys, and state the excellencies and defects of each.

In a system of pulleys, in which each pulley hangs by a separate string, there are three pulleys of equal weights; the weight attached to the lowest is 96 lbs., and the power is 33 lbs. ; find the weight of each pulley.

5. Describe Attwood's Machine, and show how the three laws of motion are illustrated by different experiments on the machine.

Two weights of 63 and 64 ounces respectively, are hung over a nearly frictionless pulley by means of a fine silk string; determine the spaces described by these weights at the end of 1, 2, 3, 4 seconds.

6. Explain the terms "centre of oscillation," "centre of percussion," employed in dynamics.

A mass of oak swung from a horizontal axis makes 43 oscillations in a minute ; where is its centre of percussion?

7. What is meant by "the moment of inertia," and "radius of gyration" of a body about an axis?

Find them about the axis on which a grindstone revolves, which is 4 feet in diameter and 8 inches thick.

8. State and prove the two conditions fulfilled by a floating body. What third condition is necessary that its flotation may be stable?

A cube is placed in a liquid four times its density ; show that there are three positions in which it will float with only one edge in water.

9. Describe the action of a common pump; point out the practical defects, and the limits to its working.

Why does the labour of working it increase at every stroke until it discharges water?

What other pumps may be used where the common pump fails?

10. Describe the syphon, and explain by it the action of intermittent springs.

11. Give the chief features in the construction of an aneroid barometer.

12. Describe a diving bell.

A diving bell, of the form of a cube 10 feet each way, is sunk to a depth of 400 feet; how far will the water enter at first?

13. Investigate the strain at each point of a flexible chain hung from two horizontal points.

How will your investigations affect the construction of suspension bridges?

14. Show that the most general motion of any free rigid body may be represented by two co-existing motions.

PRACTICAL MECHANICS.

THREE HOURS ALLOWED.

1. Describe the single-acting steam-engine invented by Watt to remedy the defects of Newcomen's atmospheric engine.

2. Sketch in section the cylinder, piston, and steam-valve of a double-acting steam-engine, and explain the manner in which the admission and exit of the steam is regulated?

3. What is meant by working an engine expansively, and how is it accomplished? If the steam be cut off when the piston has completed one-fourth of its stroke, show that the work done in the cylinder is more than half that which would result from maintaining the full pressure of the steam until the end of the stroke.

4. Explain the "parallel motion" of a beam-engine.

5. You are required to give some account of the construction of a locomotive engine and boiler, and to point out the peculiar merits of Stephenson's invention.

6. Explain the following mechanical contrivances:—(1) A ratchet-wheel; (2) a mangle-wheel; (3) an escapement; (4) a fusee; (5) bell-crank levers; (6) the Geneva stop.

7. What is the usual arrangement of the train of wheels in an eight-day clock? How is the motion of the last wheel controlled?

8. Mention some contrivances which exhibit motion of a compound or aggregate character. Explain the sun and planet wheels invented by Watt to impart motion to the fly-wheel of a beam-engine, and show that the fly-wheel makes two revolutions for each double stroke of the piston.

9. You are required to explain, in general terms, the construction of a machine for planing iron, and to describe the mechanism employed for obtaining the necessary movements.

10. Describe some form of self-acting drilling machine

ELECTRICITY, MAGNETISM, AND HEAT.

THREE HOURS ALLOWED.

1. Illustrate and explain the terms, magnetic attraction, repulsion, and induction.

2. What is meant by the terms *Isoclinal lines.* Explain the mode of distribution of terrestrial magnetism.

3. Name the most strongly diamagnetic bodies, and state the nature of their properties.

4. State the leading properties of electricity as excited by friction.

5. What is an electrophorus? Explain its action.

6. Give some account of the means employed to protect ships from lightning, and of the conditions essential to efficiency.

7. What is meant by "quantity" and "intensity" in a voltaic battery, and for what purposes are those qualities respectively most available?

8. Explain the structure and action of De Luc's or Zamboni's pile.

9. By what means may the magnetic properties of a voltaic current be demonstrated? State some practical applications.

10. By what means can a thermo-electric be readily demonstrated, and what are its peculiar features?

11. Describe the structure and action of the electric organs of some fish.

12. Explain the relation between muscular action and a voltaic current.

13. Explain the construction of some one working submarine cable.

14. What is the object of a *relay?* Explain the construction of some efficient one, and, if you can, of some one that is employed in practice.

15. Explain the difference between *conduction* and *convection* of heat. Give some practical illustration of convection.

16. State the principal means employed in measuring heat, and the chief sources of error.

17. If a boiler, heated up to 200° C., bursts, would the whole of its contents, or what proportion of them, fly off in steam?

18. Illustrate the undulatory theory of heat by showing experimentally the application of the laws of reflection.

19. Explain the "Dew point," and the best instrumental means of observing it.

20. Explain the difference in the sensible warmth or coldness of different bodies at the same temperature. Apply this principle to clothing.

(*To be continued.*)

Home Correspondence.

RESIDENCES OF CELEBRATED MEN.

Sir,—The *Times* reports the inquiries which Mr. W. Ewart made in the House of Commons, on Friday the 17th of July, as to the possibility of marking those houses in London with the names of the celebrated persons who had inhabited them. Thus he instanced that "Milton lived in a garden house in Petty France, now No. 19, York-street, Westminster; Newton's house, in St. Martin's-street, south side of Leicester-square, was now an hotel; Dryden died at No. 43, Gerrard-street; Prior lived in Duke-street, Westminster; Sir Joshua Reynolds lived in the centre of the west side of Leicester-square; Hogarth lived in part of the Sablonière Hotel; Flaxman, at 7, Buckingham-street, Fitzroy-square—his studio was still there; Dr. Johnson died at 8, Bolt-court, Fleet-street; Goldsmith, at 2, Brick-court, Temple; Gibbon, at No. 7, Bentinck-street; Garrick, at the centre house, Adelphi-terrace; the great Duke of Marlborough died in Marlborough-house; Lord Somers's house was still in Lincoln's-inn-fields; Lord Mansfield lived in King's Bench-walk; Samuel Rogers lived in St. James's-place; and Lord Macaulay in the Albany. Other nations were in the habit of preserving memorials of their great men, and there was no reason why we should not follow their example." Many other residences might be instanced, such as those of Stephenson, Brunel, and Locke. If the principle be adopted, its application should not be limited to the Metropolis, but extended to provincial towns.

Mr. Cowper, the First Commissioner of Public Works, agreed in thinking that it would be desirable to be able to recognise the spots where persons of eminence and fame had resided. He pointed out that the matter "might fall within the function of the Metropolitan Board of Works, but still that it was the right of the owner or occupier of a house to write upon it what he pleased, and it might not be desirable to compel a man to place upon his house the name of a person who did not then live there. Some persons like to put their own names on a brass plate upon their doors, and might not wish to have the name of an eminent departed personage there."

The subject appears deserving of attention, but it is obvious that whatever is done should be of a voluntary character. Therefore, it seems undesirable that either the Chief Commissioner of Works or the Metropolitan Board of Works, or even parochial authority, should interfere. But it seems to me a proper subject for the Society of Arts to consider. The object in view is of public interest, and refers especially to celebrities in Arts, Science, Manufactures, Commerce, and Literature.

The Council might communicate with the owner or occupier of the premises, and, having obtained his concurrence, might, from its own funds, provide the necessary tablet, which, I should recommend, should not be a brass plate on the door, such as Mr. Cowper hints at, but some kind of decorative tablet, which might be executed in terra cotta. It might also be ornamental, and of a character which would decorate the outside of any house, and therefore desirable for the occupier to have.

I am, &c.,

HENRY COLE.

PHOTELECTRIC ENGRAVING.

Sir,—In bringing my process of engraving photographs, Photelectric Engraving, before the notice of your Society, I am desirous of making a few observations of a general nature. In consequence of the very questionable protection afforded by the Patent Laws, I deem it advisable at present not to publish the details of my process. I have already sacrificed much to the "idea" of engraving photographs, and as I believe I have now solved the problem in a satisfactory manner, I am naturally anxious to remunerate myself. At a future time I may make a proposal, the effect of which, if agreed to, will be to enable others to work my process.

From the encomiums passed by highly qualified judges on the specimen I now submit*—Kenilworth Banqueting Hall, from a photograph by Bedford—I think I am warranted in saying that I have solved the problem of successfully engraving photographs. But I should not consider myself entitled to the merit of this discovery were the specimen above mentioned touched up by the graver, or even the result of a happy chance. I am glad to be in a position to say that the specimen has only required careful cleaning, and that unless my head and my hands fail me, the result is certain. I can guarantee to produce, in a period varying from one to three weeks, an engraved plate from a photograph. In this plate, that which constitutes the essence of the photograph and the despair of hand labour—*fac-simile* even to minute and almost microscopic detail—shall be present. To attain this result, all that I require is a good reversed negative (easily produced by reversing the glass), and a positive print merely fixed with hypo, not toned.

The methods which have hitherto given most promise are the bitumen process, photoglyphy, and photogalvanography. The other processes of photolithography and photozincography, from their very nature, cannot rival the richness of plate printing. The bitumen process and photoglyphy are essentially etching processes, and involve much hand labour and consequent loss of fidelity. Photoglyphy is the least satisfactory of the two, as the etching ground employed is of a very delicate nature, and the photographic chemical, bichromate of potash, has the unfortunate quality of destroying detail, the longer it is submitted to actinic influence.

The most important step in advance was photogalvanography. This process came into my hands when in a most crude and impracticable condition, and after it had been given up as useless by others. By much patient labour I succeeded in making it practical, and the process has ever since been worked with the improvements which I effected. I was not permitted to reap the fruit of my labours, and after a considerable sum had been expended, by my then partners, to develope the process in a direction to which it was wholly unsuitable, the process has been almost abandoned.

Photogalvanography, like photoglyphy, depends on the peculiar action of bichromate of potash, in combination with gelatine. In this lies its weakness. It loses detail—the more so as it requires a very long exposure, sometimes upwards of six hours, and then without any certainty that the right exposure has been attained. There are consequently numerous failures from this one cause alone.

I experimented long with this process, and found that the result was due to chromic acid. In other words, that with a composition merely of chromic acid and gelatine, a raised image with granulation could be produced. From this raised image the electrotype plate was subsequently made. Independently of the loss of detail, and the uncertainty in the exposure—both defects inherent in the process—the granulation was of a peculiar zig-zag and wiry character, which was of great value in the vigorous parts of the picture, but became broken or unconnected in the half-

* The specimen may be seen at the Society's House, on application to the Secretary.

tones and fine details. This led to a pretty free employment of the graver and roulette, just in the very parts which made hand-labour expensive. The process, indeed, was never capable of the high flight which was attempted, and, as I predicted, it broke down. Where expense was no object, the graver was a great assistance, but it lessened the value of the *fac-simile.*

In photoglyphy and photogalvanography, the results are obtained from a positive impression.

It was after experimenting some time with photogalvanography that it occurred to me to strike out in a different direction. Anyone acquainted with engraving is aware that aqua-tint and "chalk," or stippling, produce fine grain, half tones, and detail. The problem I set myself was how to imitate this combination. The aqua tinter employs common resin dissolved in spirits of wine. This poured over his plate evaporates, and leaves numerous globules of resin attached to the surface. The size of these globules depends on the proportion of resin to spirit. When the acid is put on the plate the resin acts as a resist, and a tint is produced in the intermediate parts. If the plate were now electrotyped before the removal of the resin, and a print taken from the electrotype, the resin parts would give a kind of stipple or "chalk" marks, interspersed with tint. It is something similar to this which I have succeeded in imitating, with peculiarities *sui generis,* by photography and the electrotype. I can also, as it were, modify the size of the dots, obtaining them so fine as to carry almost microscopic detail; but if too fine there will be deficient depth in the dark. In this as in all things there is the happy medium, and this I believe I have secured. I commence with the negative. This should be reversed. From the negative a positive proof is taken; this I prefer not toned but merely fixed in the sepia colour by the "hypo." I cover the negative, which must be varnished with a material from which I obtain a latent positive. This latent positive I turn by a simple process into a suitable negative, and it is with this negative that I subsequently manipulate. I can time the exposure to a nicety, a few seconds over or under making an inappreciable difference. The excess or deficiency must not however extend to minutes. If necessary I can electrotype direct upon my material; but as this might lead to the discovery of part of my process, I prefer to make a different kind of matrix.

I should have been glad to have taken out a Patent in order to grant licences, but as the lawyers say no Patent is valid till well litigated, I prefer to run the risk of competition, which after all is of more benefit to the Arts than monopolies such as the present Patent Laws permit.

Trusting I have not trespassed unduly on your space,

I am, &c.,

DUNCAN C. DALLAS.

Proceedings of Institutions.

Halifax Working Men's College.—The annual report for the eighth year says that the principal characteristic of the past year is steady hard work, which has, in its turn, been the forerunner of a most successful and creditable examination, creditable not only to the students by showing the extent of their knowledge and its accuracy, but reflecting also an honourable light on their teachers. The Committee tender their most sincere thanks to those to whom the success of the Institution is almost entirely owing, viz., to those engaged in the work of teaching. A branch at Copley has been lately incorporated in connection with the Haley-hill Working Men's College. The elementary class for adults has been abolished, as it was found that practically it did not act as a feeder to the Working Men's College; certainly, however, from no fault of the teacher, who was unremitting in his exertions to forward the class. The theological class has this year been attended by some of the most intelligent of the students, the regularity of whose attendance far surpassed that of any other in the College. The class in book-keeping still keeps up its number, and continues as great a favourite as heretofore. The singing classes have been discontinued (at any rate for the present) partly on account of the pressure of work on both College and Institute, arising from the new educational code, and partly from the apathy shown by many of the members. The Society of Arts' Examinations continue very popular, as they furnish a good and true standard by which to measure the yearly progress in the different subjects. The science classes, though not so numerously attended as they ought to be in such a large manufacturing town as Halifax, have produced very satisfactory results. In the Examinations held in May last, by the Department of Science and Art, out of 24 candidates 23 passed, and eleven received prizes for chemistry and physics. The Young Women's Institute never was in a more satisfactory condition. During the past year the times of attendance have been altered from three to four nights per week, and this has had a good effect. The attendance has been much greater since the alteration, and the progress of the young women has also been in a proportionate measure increased. Needlework, one of the most important subjects, has this year received its due share of attention. Pupils and teachers have alike striven to achieve one result, viz., a most creditable display of plain needlework. There is a class for the repairing of clothes, which has already been productive of some good. The dressmaking class still continues its useful work, and in several instances the members have thankfully acknowledged the great benefits they have experienced from the instruction given. The recreation ground was never so well attended, and the effect was visible in the students in the greater energy which they threw into their studies. The total number on the books is 197; number admitted since Easter, 1862, 199; average nightly attendance, 100; average weekly attendance, 136; Copley branch, number on the books, 26.

Newcastle-upon-Tyne Church of England Institute.—The Ninth Annual Report of this Institute states that very considerable progress has been made during the past year. The treasurer's account shows that the state of the finances is satisfactory, although a considerable sum of money has been expended to increase the advantages offered to members. The resources available for the year were materially augmented by the proceeds of the annual *soirée,* which was held in the new Town-hall, under the presidency of the Worshipful the Mayor of Newcastle (Joseph Armstrong, Esq.) Many new members have been added during the year. The number is now 350. During the year 246 additional volumes have been added to the library. The total number of books is 2,684. The annual circulation has reached 7,500 volumes. The Council pay special attention to this important department, and they will continue to supply as many works as possible of general interest. Every season the lectures have increased in popularity. The room is now filled upon each occasion. The course for the past winter was as follows:—Rev. Canon Prest, M.A., "India"—Rev. R. F. Wheeler, M.A., "The Post office"—Rev. S. A. Herbert, B.A., "Sketches from the History of the Jews in the Dark Ages"—Rev. C. H. Banning, M.A., "The English Jew in the Nineteenth Century"—Rev. Vyvyan H. Moyle, "A Popular View of Church Architecture"—F. R. Wilson, Esq., A.R.I.B.A., &c., "The Military and Monastic Life of the Middle Ages in Northumberland." The following classes are in operation:—One for the study of French; one for vocal music; and one which has recently commenced, a discussion class, for the mutual improvement of its members. Several members and associates have again obtained certificates in various subjects at the Examinations of the Society of Arts. Upon the whole, the Council can look back on the past year with satisfaction; and they hope to be enabled, during the present year, with the assistance of the members, to make the Institute still more worthy of the mission upon which it has entered.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 8th July, 1863.

Par. Numb.
404. Coals, Cinders, and Culm, &c.—Account.
409. Dockyards—Admiralty Order.
412. Burlington House and Gardens—Returns.
180. Bills—Landed Property Improvement (Ireland).
212. ,, India Stock.
213. ,, Fortifications (Provision for Expenses).
214. ,, Fisheries (Ireland) (amended).

Delivered on 9th July, 1863.

389. Holyhead Old Harbour—Return.
393. Post Office—Return.
408. Mail Contracts (West Indies)—Copy of Correspondence.
215. Bills—Metropolitan Main Drainage Extension.
216. ,, Railway Bills (No. 2).
217. ,, Sydney Branch Mint.
218. ,, Promissory Notes and Bills of Exchange.
219. ,, Navy Prize Agents, &c. (as amended in Committee, and on Re-commitment).
220. ,, Alkali Works Regulation (amended).
Railways in India—Report by Juland Danvers, Esq.
Sanitary State of the Army in India—Report of the Commissioners.

Delivered on 10th July, 1863.

388. Joint Stock Companies (Limited)—Return.
400. Fisheries (Ireland)—Return.
420. Railway Trains (Redhill)—Returns.
419. Army and Militia Services (1861-2)—Return.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 17th, 1863.*]

Dated 28th April, 1863.

1067. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for preserving property in case of shipwreck. (A com.)

Dated 7th May, 1863.

1146. C. A. Day, A. Lamb, and T. Summers, Southampton—Imp. in marine engines.

Dated 12th June, 1863.

1475. J. F. Tone, Newcastle-upon-Tyne—Imp. in the prevention of smoke in steam boilers and other furnaces. (A com.)

Dated 13th June, 1863.

1482. R. Blackburn, Exeter—Imp. in traction engines.
1485. J. S. Benson and D. Jones, Birmingham—An improved construction of removable head for casks, applicable to the closing of other vessels.

Dated 15th June, 1863.

1498. R. W. Gordon, Belfast—Imp. in machinery for spinning flax and other fibrous substances.

Dated 17th June, 1863.

1523. E. Wolf, Sambrook-court, Basinghall-street—A new or improved wrapper or wrapping material for use in smoking tobacco.

Dated 18th June, 1863.

1525. J. L. Ganne, Cour-Cheverny, France—Imp. in toy pistols.
1527. D. Barker, Milton-street, Wandsworth-road, Surrey—Imp. in the treatment and preservation of yeast.
1529. E. Ivett, Bedford—Improved machinery for the manufacture of tiles.
1531. E. Gossiaux, Laeken, near Brussels—An improved machine for making bolts, rivets, and spikes.

Dated 19th June, 1863.

1533. E. Howarth and J. Brown, Tonge, near Middleton, Lancashire—Certain imp. in apparatus for steaming cotton or other fibrous substances.
1535. R. Marrison, Great Oxford-street, Norwich—Imp. in breech-loading fire-arms.
1537. A. Morel, Roubaix, France—Imp. in machinery for combing wool and other fibrous material.
1539. J. Watts, Coventry—Imp. in machinery or apparatus for the manufacture of malt.
1541. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of leaden pipes. (A com.)

Dated 20th June, 1863.

1543. T. Smith, Tenter-lane, Leeds, T. Moore, Upper Mills, Wandsworth, near London, and M. Burrell, Kings Mills, Leeds—Certain imp. in the construction of reels covered with silk or other suitable material used as machines for the purpose of dressing flour.
1545. D. D. Kyle, Victoria-street, Westminster—An imp. in baths.
1547. R. Brownlee, Glasgow—Imp. in sawing machinery.
1551. J. L. Clarke, 45, Westbourne-terrace, Hyde-park—Imp. in apparatus for turning the leaves of music and other books.
1553. F. Jenkin, Duke-street, Adelphi—An electric tell-tale compass.
1555. W. L. Winans and T. Winans, Dover-street, Middlesex—Imp. in the construction of steam vessels.
1557. W. L. Winans and T. Winans, Dover-street—Imp. in adapting propellers for propelling ships or vessels for ocean navigation.

Dated 22nd June, 1863.

1566. F. Boult, Liverpool—An improved method or process for obtaining patterns and designs for the arts and manufactures. (A com.)

Dated 1st July, 1863.

1636. T. Boyle, 31, Gray's-inn-road—An improved system of ventilation applicable to every description of dwelling place and building.

Dated 2nd July, 1863.

1646. R. A. Brooman, 166, Fleet-street—Certain compositions for protecting metals and metallic articles from oxidation, and for coating slate, bricks, pottery, and ceramic ware. (A com.)
1648. E. Lloyd, 22, Wells-street, Saint Marylebone—An improved composition for waterproofing, softening, and preserving all kinds of leather and articles made therefrom.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

1701. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in lever horse-power machines, the cog-gearing employed being applicable to other machines. (A com.)—8th July, 1863.
1752. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in certain descriptions of breech-loading fire-arms. (A com.)—13th July, 1863.

PATENTS SEALED.

[*From Gazette, July 17th, 1863.*]

July 17th.
177. J. W. Meears.
July 16th.
145. L. Verdure.
178. A. Phillips.
192. H. Caro and J. Dale.
198. J. M. Binger.
206. J. Milner.
210. F. N. Gisborne.
222. A. J. Saxe.
226. W. F. Stanley.
232. H. H. Henson.
243. H. B. Barlow.
260. H. Crichley.
274. W. Clark.
791. N. R. Hall.

[*From Gazette, July 21st, 1863.*]

July 18th.
11. J. E. Baker and J. Landon.
July 21st.
209. C. Stopford.
223. R. A. Brooman.
237. W. Rollason, jun.
239. J. Edmondson & T. Ingram.
241. D. E. Hughes.
261. B. J'A. Bromwich.
273. G. Blake.
342. J. Cameron.
400. W. C. Paul & A. T. Shore.
480. H. Mackinder.
667. W. Wood.
786. G. F. Key.
929. R. Reeves.
1251. J. H. Johnson.
1256. A. Parker.
1418. G. W. E. Friederich.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, July 21st, 1863.*]

July 13th.
1701. S. C. Lister.
1750. A. B. Woodcock.
1816. A. Gélis.
July 14th.
1731. E. Loysel.
1810. T. Fowler & De G. Fowler.
July 15th.
1726. J. Fletcher.
1730. A. C. Bamlett.
July 17th.
1779. G. H. Birkbeck.
July 18th.
1754. J. Saxby.
1764. C. C. J. Guffroy.
1769. J. H. Young.
1772. M. A. F. Mennons.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, July 21st, 1863.*]

July 14th.
1661. W. Watt.
1674. T. Duncan.
July 16th.
1670. H. Turner.
July 18th.
1725. J. E. Hodges.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4570	July 3.	New Form for Packets of Paper	Frederick Barker	13, Dorcas-terrace, Hammersmith, W.
4571	,, 18.	Fire Bars	Thomas T. Jopling	Dunning-street, Sunderland.
4572	,, ,,	Rivet Hob Nails for Boots and Shoes	Henry Bell	Birmingham.
4573	,, 20.	Combined Sketching Easel and Stool	Henry Gillott	Birmingham.

Journal of the Society of Arts.

FRIDAY, JULY 31, 1863.

SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

NOTICE TO MEMBERS.

In accordance with the Report adopted at the General Meeting held on the 17th inst., additional subscriptions for carrying out the Society's Memorial of His Royal Highness the Prince Consort are invited. Any member desiring to subscribe, or to increase the amount of his subscription, is requested to send a Cheque or Post-office Order, made payable to Mr. Samuel Thomas Davenport, the Financial Officer.

THE ROYAL ACADEMY OF ARTS.

The Commissioners, consisting of Earl Stanhope (Chairman), Viscount Hardinge, Lord Elcho, M.P., Sir Edmund W. Head, Bart., Mr. William Stirling, M.P., Mr. Henry Danby Seymour, M.P., and Mr. Henry Reeve, appointed "to inquire into the present position of the Royal Academy in relation to the Fine Arts, and into the circumstances and conditions under which it occupies a portion of the National Gallery, and to suggest such measures as may be required to render it more useful in promoting Art and in improving and developing public taste," have issued the following report:—

The Royal Academy, since its first establishment in 1768, appears to us to have been of great service to the country, in assisting to keep up and to cultivate a taste for Art. Comprising in its ranks a long series of eminent names, its honours have been an object of emulation to the great body of artists, and an order of merit, though with some important exceptions, to the most distinguished.

Many of its members have at every period, and often at a great pecuniary sacrifice to themselves, given time to the superintendence and teaching of the schools. That teaching has in all cases been entirely gratuitous. The funds of the Academy have been liberally applied to the relief of its veteran members, or of their widows, who have fallen into unmerited distress. Other artists, also, wholly unconnected with the institution, except in the light of exhibitors, have in their hour of need largely participated in its benefactions.

The merits of the Royal Academy have been recognised on several occasions by men of great eminence in public life. Thus, in the debate in the House of Commons, on the 22nd of July, 1844, Sir Robert Peel "seized the occasion of acknowledging the gratitude due to the institution (the Royal Academy) on account of the great benefit which it had conferred upon the Arts. The Exhibition was freely open to all artists, and its funds were applied solely to the promotion and support of Art, and he did say that it was to the Royal Academy, and not to Parliament, that the merit was due of founding in this country, a national school of Art."

In the same debate, Lord John Russell said that "there could scarcely be a better reply to the remarks of the honourable member (Mr. Hume) than that the management of the Royal Academy now afforded. As far as he could see, that institution was conducted in no grudging or envious spirit towards artists; no talent was ever kept in the background; no proper advantage appeared to be in any way denied it."

It does not seem to us inconsistent with the general commendation which we have here expressed, that we should now have to state some serious defects, and to propose some considerable changes. In several instances experience has demonstrated the existence of evils which at first might not be anticipated or surmised. It has also frequently happened that the original framework or constitution of the Academy has proved inadequate to the largely increased number of artists, and to the growing requirements of Art.

One of our first inquiries was directed to the precise legal position of the Royal Academy, under its foundation by the Royal Instrument, dated December 10, 1768. It appeared to us that the future utility of the Royal Academy must depend on its funds, and that its capacity for entering into any arrangement with the Government, with regard to the erection or improvement of any building, involved the question of the security of its property, as held under the present constitution.

We therefore felt it our duty to request the Right Honourable the Secretary of State for the Home Department to obtain for us the opinion of the law officers of the Crown, on certain doubtful questions which had suggested themselves to us in the course of our inquiry.

We are now, according to the advice which we have received, able to report our belief that the Declaration of Trust under which the property is held is such as could be enforced in a court of equity; that the trusts are unobjectionable; and the *cestui que* trust well ascertained. We do not think that the requirement of the Royal sanction to grants of money to any one person exceeding £50 would operate, beyond the letter of the article itself, which forbids such excess only without the prescribed sanction. We believe, also, that charity to members and teaching in the schools being duly provided for, any surplus funds may, under the direction of the Council, be applied to such purposes as may tend to support and forward the main objects of the society, as they are to be collected from the "Instrument" and the "Constitution and Laws."

We believe that the "Instrument" has none of the characteristics or incidents of a Charter. It possesses, however, the force of a solemn and public declaration by the original members of the society, of its main objects, to which the succeeding members, from time to time, have become, practically, parties; and in that light, it would, in our opinion, be regarded in a court of law or equity; in other words, such is its legal effect. We think further that the trust expressed in the Declaration of Trust might be enforced against the Trustees, in case of default, at the instance of any member or officer of the society suing for and on behalf of the general body.

The legal questions have thus received a sufficient solution; nevertheless, it seems to us that the position of the Academy would be far better defined and more satisfactory if, instead of the instrument of 1768, it rested on a royal charter to be granted by the crown. We think also that such a charter would be most desirable, as giving to the Academy a clear and definite public character instead of the anomalous and ambiguous position which under the instrument of 1768 it may be held to occupy.

There is one part, however, of the present system which, though not free from some anomaly, seems to us attended with great practical advantage. We allude to the personal relation which exists between your Majesty and the Academy, in the appointment or the confirmation of various officers and in several other points on which your royal consent is required. On this subject we fully agree with the opinion which a witness before us, Lord Taunton, has expressed, that "this kind of personal communication between the sovereign and the Royal Academy is very useful both to the throne and to the artists of this country. To the throne it gives that kind of lustre which the cultivation of the arts and the patronage of the arts

confer upon persons in that elevated station; while, undoubtedly, to the artists it gives encouragement of a most gratifying kind." We think that it implies on the part of the sovereign a personal interest in the Fine Arts, and that it confers dignity upon the Academy itself. We are therefore clearly of opinion that in any Charter that might be given, the present relation between the sovereign and the Academy ought to be maintained. But we would further add to that relation the grant of visitatorial power to the crown, similar in principle to the visitatorial power that exists in the colleges of Oxford and Cambridge, so far as regards acts of the Royal Academy which have not received the special sanction of the crown.

Supposing a Charter to be given, we will now proceed to state our judgment as to the manner in which the Academy should be reconstituted, partly by provisions in the Charter and partly by arrangements to be made in the Academy itself. For the greater clearness of our inquiry while it was in progress, we divided it so far as possible into five classes or heads; and it is under these heads that our recommendations may now, we think, be most conveniently set forth.

A.—Constitution of the Academy.

All the members of the Academy whom we have had occasion to examine, have with the utmost frankness and readiness explained to us the state of that institution. We desire to refer more especially to the very able evidence given by Sir Charles Lock Eastlake, the President, in a manner well according with the high character which that gentleman so deservedly bears. His evidence will be found to detail in the most ample manner the exact situation of the Academy in every branch of its affairs.

Looking to the future, some of the witnesses whom we have examined have expressed an opinion that the Academy might properly be confined to painting only, leaving architecture and sculpture to be provided each with a separate institution of its own. We can by no means concur in this view of the subject. We think it most desirable that the Academy should, as at present, embrace the great branches of art—painting, sculpture, and architecture; and we desire only to point out the means by which in our judgment the Academy may be made more conducive to that end.

Other witnesses have expressed an opinion that there might be a representative system established by which in the event of a vacancy the candidate should be nominated by some constituent body independent of the Royal Academy. But whenever we came to inquire how that constituent body should be composed, or what should be the qualification of its members, we did not obtain from such witnesses any very clear or satisfactory solution. It seems to us that the object sought is not attainable without incurring the risk of much greater evils than it professes to cure, and we can by no means advise any attempt to introduce it.

But while holding this opinion we conceive that the constitution of the Academy should rest on a wider and more liberal basis, and that it should be made more useful than it is at present in promoting art, and in aiding the development of public taste. We think that it should be viewed as a great national institution for the promotion of art, and that, by the grant of a Charter as well as by the rules which it should frame, its public character and duties should be distinctly recognised and defined.

Looking, in the first place, to the composition of the Royal Academy, it has been shown in evidence that the funds of the Academy are mainly supplied by the proceeds of the annual exhibition, and that the attraction of that exhibition depends chiefly upon the exertions of the painters. From this consideration it would seem to follow, as several witnesses have stated, that there is no injustice or anomaly in the fact that the members of the Academy should consist of painters in a larger proportion than of artists in any other walk of art. Looking, however, to the fact that it is desirable that the Academy should embrace all the main branches of art, we think that the Academy might be advantageously extended from its present number of forty academicians and two academician engravers, to the number of fifty, the additional eight members thus to be elected being chosen in the first instance from the classes of architects and sculptors.

There is no point on which greater variety of opinion appears to prevail than on the question of adding what may be termed a lay element to the Academy. Many members of the Academy, Sir Charles Eastlake at their head, and all entitled to great weight in their opinion, have, while expressing their respect for any person who might be so selected, stated strong objections to associating non-artists with artists in deciding any question of Art. Other witnesses, again, comprising very eminent members of the artistic profession, and gentlemen worthy of all honour in their position as critics and connoisseurs, declare themselves clearly of opinion that the addition of some persons not artists would have a most valuable tendency in conciliating the confidence of the general public, and would have some practical effect in improving the working of the system. We are bound to declare, on careful consideration, that our own judgment points to the second of these alternatives. We are quite aware, however, that its harmonious action must depend in a great measure on the practical concurrence and good feeling of the members of the Academy themselves, and we are most anxious, therefore, to introduce this new element in such a manner, and with such conditions, as may render it consistent with that weight which should properly belong to artists by profession.

We are, therefore, of opinion, that to the fifty professional Academicians there should be added ten members not being artists. We propose to leave their election to the Academy in General Assembly, but subject to the confirmation of the Crown. In our judgment they should be appointed for a period of five years, but should be re-eligible. Any non-professional member who did not attend at least one meeting in any one year should be held to have vacated his office.

It is to be observed that, even as at present constituted, the Academy comprises five gentlemen not artists as honorary members. Those are the Bishop of Oxford, Chaplain; the Very Reverend Dean Milman, Professor of Ancient Literature; George Grote, Esq., Professor of Ancient History; Sir Henry Holland, Baronet, Secretary for Foreign Correspondence; and Earl Stanhope, Antiquary. Those honorary members, however, are not expected to perform any duty of any kind; their posts are conferred upon them as personal distinctions, and do not entitle them to take any part in the proceedings of the Academy. The members whom we desire to see introduced would, on the contrary, have important duties to fulfil.

Besides the duties which the lay members might have entrusted to them in the management of the Academy itself, some of them might also render it important service elsewhere, if their presence in either House of Parliament enabled them to explain its proceedings, when required, to the Legislature. On the other hand, these lay members should hold no diploma nor derive any titular distinction from their connexion with the Academy. Nor should they be held entitled to any of the pensions or retiring allowances which the artist members of the Academy may claim.

In the event of ten such members being added to the Academy, to be chosen by the Academy itself, our chairman is desirous to explain, on his own part, that he would on no account seek to avail himself of his present position as one of the five honorary members, or deem himself on that account entitled to maintain an office bearing perhaps the same name but attended with important duties. On the contrary, he should then consider his post as vacant, to be filled by the Academy in any manner they might deem preferable.

The academicians would therefore consist of fifty professional and ten non-professional members.

The system of Associates, as it exists at present, seems to be almost by common consent admitted to be unsatisfactory. The number is fixed at twenty, and the persons elected to that rank have been encouraged to form hopes, considering their limited number, of speedy admission to the Academy—hopes which their own progress in Art has not always completely justified, and which could not in every case at present be fulfilled. It has been suggested by Sir Charles Eastlake that the number might be advantageously reduced. Other witnesses have argued with considerable force that the whole probationary system is unnecessary, and that any artist deemed deserving of the distinction ought at once to be admitted to the full honours of the Academy.

On careful consideration, however, we have arrived at the conclusion, supported by other evidence, that the Associate class, so far from being either abolished or reduced, might be far more advantageously extended. We think that its extension, under such rules and provisions as we shall now proceed to explain, would be most valuable as introducing a large amount of youthful talent into the Academy, and as connecting that institution more thoroughly than is the case at present with the whole body of artists beyond its walls.

We would therefore propose that the number of the Associates of the Royal Academy should be increased at once to fifty, with power to fix at any time hereafter a larger number, with the assent of the Crown.

We think, however, that this Associate class should not, as the one now existing, be debarred from any control or jurisdiction in the affairs of the Academy. We propose, on the contrary, that the Associates should be members of the corporate body, and jointly with the Academicians should constitute the General Assembly.

Several persons have suggested to us that the President instead of being, as the rules at present require, himself an artist, should be some person of accomplishments and of high social position not necessarily a professor of Art. We are of opinion that such an election would not be consistent with the dignity of British art, and we recommend that the President should in all cases be nominated from among the Royal Academicians, irrespective of the branch of art that he may happen to profess, and that he should be selected not because he belonged to one particular branch, but on account of his superior fitness for the post.

The present salary of the President is fixed at £300 a year. We have no hesitation in expressing our opinion that this salary is a wholly inadequate remuneration for the duties he is expected to discharge. Looking to the dignity of that office as we desire it to be maintained, and looking at the remuneration afforded in similar positions of public trust, we conceive that the position and labours of the President of the Royal Academy must be such as to justify an amount of income very far exceeding that which is now bestowed. We conceive that in emolument as well as in dignity the Presidency ought to be established and regarded as the great prize of British art.

We recommend:—

That the President should, as now, be elected annually, but should be re-eligible.

That there should be also two Vice-Presidents as honorary officers, who should be selected from the other two main branches to which the President himself may not belong, so that in all cases Painting, Sculpture, and Architecture should be represented, either in the President or in a Vice-President.

That the President should be nominated by the Royal Academicians, and should be elected by the General Assembly.

That the Council should be nominated by the Royal Academicians from amongst their own body, subject to the approval of the General Assembly, the Council to consist of the President, the two Vice-Presidents, and nine other members of the Royal Academy, and of those nine two should be non-professional members.

That one-fourth, that is, three members of the Council, one of them being a non-professional member, should annually vacate office, but should be re-eligible.

That the Council should have the general management of the executive affairs of the Academy, with power to make bye-laws for their own guidance.

That there should be a General Assembly, consisting of Royal Academicians and Associates of the Royal Academy, held at least twice in each year, at which the members of the Council should be approved, the rules confirmed, and the elections made.

That it should be in the power of the President at any time to summon a special meeting of the Council, and that on the receipt by the President of a requisition, signed by a certain proportion of Academicians or Associates, he should be bound to summon a General Assembly.

That it should be in the power of the President and Council at any time to summon a General Assembly of the Academy.

That an annual report should be published of the proceedings of the Academy, with a statement of its income and expenditure duly audited, and that such report should be submitted to the General Assembly at the first of its annual meetings for approval and adoption.

It appears to us that the advantages of the Royal Academy and of its Council, on the plan that we suggest, would be extended to many other points besides the improved working of the Academy itself. There has been a general, and, as we think, well-founded complaint during many years of the bad taste and utter want of system which have been displayed in the construction of our public buildings. That construction has depended too much on the rapid succession of the several politicians who have filled the office of First Commissioner of Public Works, and on the conflicting votes, which, according to their recommendations, have been passed by the House of Commons. It seems to us that the Royal Academy, constituted in the manner we have proposed, and comprising within it some men of approved ability, not themselves artists, but entitled to pass a judgment upon Art, would form a valuable permanent Council of advice and reference in all matters relating to the Fine Arts, public monuments, and buildings. We think that the successive advisers of the Crown, far from feeling any jealousy of such advice, would welcome it with pleasure as relieving themselves from questions of great embarrassment, and as likely to be conducive to a more satisfactory result in Architecture and in Art than has at present been found attainable.

It is only since 1853 that engravers have been deemed entitled to election as Royal Academicians. Even at present they do not appear to be regarded as full Academicians, but form a separate class under the name of Academician Engravers, and also of Associate Engravers. We can see no just ground for their still forming any separate class. We think that such members of the body as are deemed entitled to that honour should be elected to the full rank of Academicians and Associates, and bear those titles in the same manner as the rest.

Within the last twelve months a system has been established in the Royal Academy, by which Academicians far advanced in life, and less fitted for active duties, are allowed to withdraw from the full number, under the title of honorary retired Academicians, and with the enjoyment of a pension of £100 a year. At the commencement of our inquiries two Academicians had already availed themselves of this privilege, and a third, we understand, has since been added to the number. We desire to express our approval of this regulation, by which Academicians in the decline of life may make way for others more fitted for active duty, while retaining themselves the rank and the distinction to which they are well entitled, as well as a share of the emolument which they may be considered to have fairly earned.

In all foreign Academies, so far as we are aware, there exists an honorary class consisting of artists of other countries, by which such artists may receive tokens of honour

from other nations besides their own. It is very disadvantageous to the Academy that no such members should at present be included in its ranks, and we recommend that there should be Honorary Foreign Members of the Academy, selected by the Council, and approved by the General Assembly.

That they should have no voice in the management of the concerns of the Academy; but that they should be entitled to send a certain number of pictures to the annual exhibitions of the Royal Academy.

We also recognize great value in the suggestion first made to us in the evidence of Mr. A. J. Beresford Hope, that there should be a class of Art-workmen connected with the Royal Academy. Looking to the intimate connexion between the Fine Arts and those of a more mechanical character, and the great importance of extending the influence of the former over the latter, we think that workmen of great excellence in metal, stone, wood, and other materials, might be properly distinguished by some medal or certificate of honour conferred by the Royal Academy, and in certain special cases, become members of the Academy at least as associates; each of those Art-workmen might properly receive a bronze medal, and the appellation of "Royal Academy Medallist."

That the Art-workmen should be nominated by the Council, and elected by the General Assembly.

That it is not desirable that artists should be required to inscribe themselves as candidates for admission to the honours of the Royal Academy.

That it is not desirable that artists should cease to belong to other Art Societies before they can be admitted to the honours of the Royal Academy, and that in exhibiting their works they should not be restricted to the Royal Academy Exhibition.

That there should be no limit to the age at which an artist is eligible as Art-workman, Associate of the Royal Academy, or Royal Academician.

That the Royal Academicians should be elected from the rank of Associates on the ground of merit alone, and wholly irrespective of any consideration arising from the length of time during which they may have been on the list of Associates of the Royal Academy.

That the non-professional members be elected in the same manner as the Royal Academicians.

That any Associate designed as a candidate for the rank of Royal Academician should be proposed and seconded by Royal Academicians, and his name put to the vote at a General Assembly.

That any artist designed as a candidate for the rank of Associate should be proposed and seconded by Royal Academicians or Associates, and his name put to the vote at a General Assembly.

That in the elections, whether of Royal Academicians or Associates, no person shall be deemed elected who has less than half the votes of the members of the Assembly present. Two-fifths of that Assembly to be deemed requisite for a quorum.

That all voting, whether for the election of Royal Academician, Associate of the Royal Academy, honorary member, or any other person, should be open.

That all elections of Academicians and officers should receive the confirmation of the Sovereign.

B.—Funds.

It is not necessary for us to refer to the sum of money derived by the Royal Academy under the will of Mr. Turner, as finally settled under directions of the Court of Chancery; but we must not omit to mention the trusts which will ultimately be imposed on the President and Council of the Academy, by the will of the late Sir Francis Chantrey.

It appears that at a future, time after payment of £300 per annum to the President, and £50 to the Secretary, the remaining income will have to be expended, under the direction of the President and Council, in the purchase of works of Fine Art, in Sculpture and Painting, of the highest merit executed in Great Britain, such purchases to be made solely with reference to the intrinsic merits of the works, and with an express prohibition against giving any orders or commissions beforehand.

It appears further that the nation has a great interest in the proper execution of these trusts, for the testator expresses full confidence that whenever the collection of the works of Art shall be of sufficient importance, the Government will "provide a suitable and proper building or accommodation for their preservation and exhibition *as the property* of the nation." It thus appears to us that the President and Council of the Royal Academy will, in fact, be trustees for the public in the purchase of these works, and in the custody of them. It seems, further, that the funds derived from the Chantrey fund will not be available for the employment of artists on commissions, or in the decoration of buildings. The merits of the work must be ascertained before it can be purchased by the President and Council of the Academy for the future benefit of the nation.

It seems obvious from the restrictions imposed in this bequest that, except as regards the sum payable to the President and Secretary, it will in no way relieve the funds of the Academy, whatever may be its value in encouraging Art, and providing the materials for a future National Museum of British Art.

We have only to add that the annual balance sheet of the accounts of the Academy should be printed and submitted along with the annual report to the General Assembly at the first of the annual meetings.

C.—Exhibition.

There is no subject connected with the Academy on which the representations made to us have been more unanimous, or in our own judgment more justly founded, than the complaints of want of adequate space.

The space now available is greatly below the requirements of the Academy, and altogether inferior to what British Art at this time demands. Indeed it to this want of space rather than to any other cause that we may ascribe a large share of the complaints that have been made. We think that the Exhibition of works of Art has, upon the whole, been fairly conducted, so far as is consistent with the existing rules, and so far as the present space permits, but we think that, in part from the imperfection of those rules, and still more from the utter deficiency of space, cases of grievance and of hardship have undoubtedly arisen. Such, indeed, seems to be the opinion of the leading members of the Academy themselves. When Mr. Frith, who had been himself this year a member of the arranging committee, appeared before us as a witness, he was asked this question:—"I understand you to say that you are strongly impressed with a feeling that unavoidably you must commit acts of injustice, that fault however not being with the arranging committee in any manner, but being due to the scanty space compared with the number of applicants for that space." To this question Mr. Frith answered as follows:—"Yes, I feel that very strongly indeed; but I think this year particularly the space has been fairly distributed. I do not admit that there has been any exceptional injustice done; there is always injustice done for want of space."

We shall proceed in a subsequent part of this report to state the manner in which, according to our judgment, a larger space should be supplied. At present we desire only to state the alteration which, supposing that space to be obtained, should be made in the rules for exhibition. According to the present rule each Academician or Associate is entitled to exhibit eight works of Art as of right. In the opinion of many even of those who possess this privilege it is excessive. It does not seem desirable that any artist, however eminent, should be allowed to exhibit so large a number; and besides the advantage that would ensue from leaving additional space for the works of other artists, it may be presumed that any artist who was restricted to a smaller number of works of Art, would ex-

hibit greater care and pains in the preparation of those works, and render them more perfect than he may sometimes have leisure to do under the present system. It may be added that, according to the evidence which we have received, this excessive privilege is very seldom, if ever, exercised to the full extent.

We also conceive that, considering the large extension which we propose to give to the Associate class, it would not be desirable to extend to them the privilege which the present members now enjoy, of sending a certain number of works of Art, as a right, for exhibition. It is our opinion that they should stand in this respect on the same footing as any other artists. We therefore propose that the Academicians and the now existing Associates should send four works of Art as of right and never more, and that Associates henceforth elected should send no works of Art as of right, and never more than four.

We think there should be an annual exhibition of works of Art, that is, paintings, including water-colour drawings; engravings; architectural designs; and sculpture, including coins, medals, engraved gems, and such works in chasing or carving as may properly be classed under the head of Fine Art.

We may here express our regret that, judging from the evidence of the Presidents of the two Water-colour Societies, there appears to be little disposition on the part of painters in water-colours to seek such a union with the Royal Academy as the importance of their branch of Art, and the peculiar eminence which it has attained in this country, would fully warrant.

That all works sent in for exhibition should be submitted to and selected by the Council.

That three Committees should be nominated by the Council, and elected by the General Assembly, for the arrangement of the works of Art so selected; each committee to consist of two Academicians and an Associate; to act under the supervision and general responsibility of the Council; and to have the advantage of paid professional assistants, if they should be required.

The first of these committees should have the power of arranging the works of painting and engraving, the second the works of sculpture, and the third the works of architecture.

It does not seem to us that any member of the Council should in any case form part of those three committees.

It appears from the evidence that a strong feeling exists among many professional witnesses against the lay members taking part in the selection of works of Art. Whilst we admit the general fairness of this selection as hitherto conducted, we still think that the participation in such a matter of persons who are not artists would be far from unfair or disadvantageous. Pictures exhibited in the Royal Academy are painted for the public, and it must be remembered that the non-professional members would necessarily form a small minority in the Council, and thus the ultimate decision in each case would practically be the result of professional votes, except in special instances where a difference of opinion might exist among the artists themselves.

We must confess that in considering this question of the votes to be given by the members who should form the Council by which works of Art are selected, we cannot conceive any system to be established by which complaints would be prevented. It is impossible but that artists disappointed in the exhibition of their works should sometimes feel their disappointment keenly, and no composition of the Council, whatever it may be, could prevent those complaints from arising. If there are only artists on the Council there will be a cry of professional jealousy; if there are lay members also on the Council there will be a cry of non-professional ignorance. It is, we fear, unavoidable that men inspired by honourable emulation in pursuing the profession in which they have applied themselves should regard as injustice any decision by which the claims of their rivals are preferred to their own.

Besides these points of regulation to which we have now referred, there are some others which we should desire to put forth in a less positive manner as suggestions. For in this case as in others we feel that if we should be successful in establishing a governing body fully entitled to confidence and likely to prove efficient in action, it would not be wise to limit the deliberations of that body on all points or with undue strictness, but that we should trust to them for the solution of many points of less importance.

Subject to this remark we would desire to suggest these points:

Whether in some cases it might not be interesting to the public, and conducive to the interests of art, that all the works of each artist should be exhibited together whenever practicable.

There is another question on which, as connected with the space available, we would refrain from suggesting any positive rule, but we think that unless in special cases no picture of ordinary size should be exhibited with its base less than two feet, or more than eight feet from the ground.

In the French Fine Arts Exhibition of 1855, and in the International Exhibition of 1862, a very satisfactory effect was produced by exhibiting some of the best works of sculpture in the same gallery with the paintings. It may be a question whether, in some instances, or under some conditions, the same system might not be adopted at the exhibitions of the Royal Academy.

We think it also desirable that rooms should be set apart for the exclusive exhibition of water-colour drawings, engravings, and architectural designs, respectively.

We would also suggest that no work should be exhibited without having the name of the artist, and when it appears desirable, of the subject, legibly inscribed on the frame, in case of a picture or drawing, or, in the case of sculpture, on the shelf or pedestal on which it stands. Although the income from the sale of catalogues would thus be diminished, it is highly probable that many persons would more frequently visit the exhibition, were they relieved from the expenses of buying and the trouble of carrying and consulting a work of which the tendency is continually to increase in size. The convenience of this arrangement has been already appreciated in the National Gallery, the International Exhibition of 1862, and in the principal galleries of the continent.

We regret to hear that a statue exhibited this year has been mutilated by accident or design whilst in the sculpture room. The want of proper space may easily lead to accidents in cleaning or arranging the room, but the effectual protection of works entrusted to the Academy for exhibition is, of course, incumbent on that body, both as a matter of duty and of self-interest.

There is another suggestion which we should desire to make, and which impresses us in a very favourable manner. We think that the charge for admission on common days should be 1s. as heretofore, but that on Mondays it might be raised to a higher sum, and that the exhibition on the other hand should be wholly free on Saturdays. It seems to us that this system, without the risk of too far impairing the funds on which the Academy has mainly to rely, might be attended with great advantage. The Monday, on which a less concourse might be expected, would be regarded as a great boon by persons of advanced years or of delicate health, who would thus avoid the jostling of the crowd. Lovers of art, who desire to study the exhibition with care, would also attach no little value to such an opportunity. On the other hand, the Saturday, on which happily many classes of workmen are now practically allowed the privilege of a half-holiday, would be valuable to them as a day of free admission, and would tend, besides the pleasure which it might afford them, to have the higher advantages of gradually forming and improving their taste in art.

D.—Teaching.

Notwithstanding the great liberality which the Academy

has shown in its system of gratuitous teaching, the number of eminent pupils who have been trained by it, and the manner in which artists of high distinction have devoted their time and attention to the schools, we are of opinion that the system of teaching hitherto followed in the schools cannot be considered as having been in all respects satisfactory.

In many respects this defect, as well as others, is clearly to be ascribed to want of space. Thus it is want of space, and no other reason, which has caused the schools to be closed at the very period of the year when their opening would be of the greatest importance and value. Supposing sufficient space to be provided, we are clearly of opinion, as indeed the members of the Royal Academy seem themselves to be, that the schools should be open throughout the year, with the exception of such times as may be set apart for vacation.

But besides these defects, for which the Academy is in no degree responsible, there are some others which are shown to be such, as we think, by experience derived in the course of years. We recommend that the present system of instruction, as superintended by the keeper in the antique school, and by visitors alone in the life and painting schools, should be abandoned. We think there should be a general director of the schools, not necessarily a member of the Royal Academy, who should receive a salary sufficient to secure the services of a first-rate teacher.

On the system of visitors there has been a considerable diversity in the evidence that has been laid before us. Some witnesses contend that by the change of visitors from month to month the students are enabled to obtain the views of several men of eminence in succession, and to derive new lights from that very alteration. Others again lament the want of a fixed and positive direction in the course of study. According to the opinion that we have just now expressed, we consider the appointment of a General Director of the Schools absolutely indispensable, and also that there should be competent and well-paid instructors at the head of the different departments under the Director.

We think that whatever advantages have hitherto attended the system of visitors, might in a great measure be still secured by the appointment of a sub-committee of the Council, which should visit the schools from time to time, reporting to the Council as to the progress that had been made, and making any suggestions that they might consider requisite.

We think that all candidates for admission into the schools of the Academy should be required to pass an examination as a test of their general education, the standard of such general education to be fixed from time to time by the Council. We would recommend that a third (that is the highest) class certificate of the schools at South Kensington in connection with the Department of Science and Art should be accepted as a sufficient Art qualification for admission into the schools of the Academy.

Considering the largely increased advantages which the students would enjoy under the schools as remodelled in the manner we propose, we do not think it unreasonable that their instruction should no longer be entirely gratuitous, but that on the contrary some moderate fees should be required. We should desire, however, to confine those fees to narrow limits, so as not unduly to press on persons of limited means.

But although we propose that the teaching in the schools should not as heretofore be gratuitous, we think it desirable for the assistance of students with limited means that scholarships or exhibitions should be established to be awarded to candidates who may show the greatest proficiency in the preliminary examinations, or display the largest amount of knowledge and the most decided progress in art at the end of the first year of their course, or at any other period that the Council may from time to time appoint. It should be an indispensable qualification for such exhibitions that the candidates should satisfy the Council that without this pecuniary aid they could not pursue their studies in the schools of the Academy.

We recommend that the Council should have power to grant admission into the schools to honorary students at an increased rate of payment without requiring them to comply with the preliminary regulations prescribed for ordinary students; such privilege of admission being designed for established artists and others who may desire to take advantage of the teaching of the Academy without the necessity of undergoing its test-examinations.

We think that there should be periodical examinations of the students, to test their progress in Art in the schools of the Academy.

That the works of the students should be annually exhibited at such time of the year as might be considered most suitable, and that this exhibition of their works should be duly notified to the public, and that there should be a public distribution of all the Academy prizes.

That chemistry, as applicable to art, should be taught, and that there should be a chemist and a laboratory attached to the Academy—colours and vehicles for painting being submitted to practical tests, and variously and publicly exposed to the action of the atmosphere, light, and time; and that the results should be carefully registered, made generally accessible, and published in the annual report of the proceedings of the Academy.

It cannot be said, as we conceive, that the present system of travelling studentship, as carried out by the Academy, has worked well, the number being far too small to have produced any practical effect. It appears to us that instead of these a certain number of Art-fellowships, so far as the funds of the Academy may properly allow, should be annually competed for, and that the examinations should be conducted by the Council, assisted by the Director of the Schools. That these fellowships should be held for a term of years, the object being to assist students in the study and practice of Art at home and abroad; but that all fellows should be required annually, during the tenure of their fellowships, to submit for the inspection and satisfaction of the Council, one or more specimen of their work in the branch of Art which they cultivate.

As connected with this subject, we would desire to call attention to the views of Mr. Gibson, as embodied in a letter which is cited by Sir Charles Eastlake in his evidence, and which had already been produced by our chairman, on the 8th of June, 1860, in the House of Lords. Mr. Gibson has pointed out that all the principal nations in Europe, except England, send pensioned students to Rome, to study sculpture, painting and architecture. The French Academy and the Naples Academy, he says, have professors to overlook the students; all other students are watched by their ministers. England, on the contrary, has neither any such branch academy nor yet the authority that would be exercised by any recognised diplomatic agent at Rome. The opinions which we have heard from other witnesses are by no means unanimous upon this subject. It might, however, seem desirable that the Royal Academy should, its funds permitting, establish a small branch academy at Rome, so far as regards, at least, the permanent residence of a professor, for a fixed term of years and at a sufficient salary, who should have a general control of such travelling students of the Academy as might at any time desire to pursue their studies in that city, where the concourse of artists for study it certainly much greater than in any other city of the world.

The system of teaching that prevails in France seems to us well worthy of consideration, on several points, by artists in this country.

E.—Charities.

In the event of the Associate class being largely increased, we think that, considering the great call on the funds of the Academy for teaching and other public purposes, it could scarcely be held as feasible that future Associates, or their widows, should be entitled to pensions.

In any case, however, all existing Associates should retain precisely the same rights and privileges in that respect as they enjoy at present.

F.—Buildings.

On a careful consideration of the statements which we have heard, and the documents which have been laid before us, we have come to the clear conclusion that the Royal Academy have no legal, but they have a moral, claim to apartments at the public expense.

The present space at the disposal of the Academy in Trafalgar-square is not only wholly inadequate, according to the judgment we have already expressed, but its tenure has been regarded as uncertain. This uncertainty of tenure and the necessity of being prepared for possible contingencies have led to an accumulation fund amounting to £140,000, a very large proportion of which might otherwise have been expended in the promotion of Art. For the same reason, probably, it appears in evidence that while the average income of the last three years amounts to £13,272, the average expenditure for the same period has amounted to no more than £8,063, showing an average surplus of £5,209. It is plain, therefore, that for the interests of Art, and for the full development of all the resources of the Academy, it would be desirable that this state of uncertainty should cease, and that the position of the Academy should be well and definitely secured.

It is further to be observed that it is only by the grant of apartments, whether permanent or temporary, to the Royal Academicians that the public acquire any right of control and jurisdiction in their affairs. If we suppose the Academy, under its Instrument, to provide a building of its own at his own charge, we cannot see how the public could claim any right of interfering with its proceedings any more than with those of any other private corporation. It is therefore by the grant of apartments adequate to the requirements of the Royal Academy, and to the claims of British Art, that the Government acquire the right of proposing to the Academy such rules and regulations as they may deem expedient, and such as in our preceding recommendations we have shown to be in our judgment requisite.

To provide satisfactory and sufficient accommodation for the Royal Academy has been the anxious aim of several successive governments. As may be seen by the evidence before us, there was an arrangement set on foot by the Government of the Earl of Derby, under which the Academy undertook to construct at their own charge a new edifice in Burlington Gardens, the grant of that site being so important as to secure to the Government at the same time its due share of weight or control in the Academy. That arrangement, however, was not confirmed by the Administration which succeeded, and the question comes before us as still altogether undecided. Meanwhile, however, the difficulties arising from want of space continue to increase from year to year, and we think it altogether beyond question that whatever arrangement may be made should be effected with the least possible delay.

It has been found impossible for us to consider this question without at the same time reviewing the position of the National Gallery. It seems to be generally admitted that the portion of the building in Trafalgar-square now occupied by the National Gallery is insufficient for the reception of the public collection of pictures. That collection may be expected to increase, as it is increasing from year to year, and not to consist merely of a fixed or nearly fixed number of works for exhibition, as in the case in the Royal Academy.

Even if the space now occupied by the Royal Academy were given up to the National Gallery, the remedy would be only of a temporary kind, as the national collection of pictures may be expected to outgrow in a very few years the space available in the entire building.

To raise upon the present site a National Gallery worthy of the nation, and of the large accessions which in the course of years may be expected, it would be found requisite to obtain possession of the ground occupied by the barracks, the baths, and the workhouse in the rear, so that a new and fire-proof gallery should be constructed. It is commonly stated that, although this scheme was sanctioned by the Select Committee of the House of Commons, in 1848, and by the Royal Commission, in 1857, considerable practical difficulties, as well as a very large expense, would attend that proposal.

Under these circumstances, we think it would be desirable that the Government should undertake the construction of a new National Gallery, either on its present site, if it could be thus enlarged, or at Burlington House.

On this point of site, as applied to the new National Gallery, we forbear, as beyond our province, from giving any positive opinion, but we are clearly convinced that if, for the reasons we have stated, the National Gallery should be re-constructed on some other site, with a view solely to its own benefit and advantage, in such a case no less benefit and advantage might be conferred on the Royal Academy. We think that in such a case the whole of the present building in Trafalgar-square should be handed over to the Royal Academy for their use, subject to such conditions and arrangements as the Government of the day might determine.

It may be worthy of consideration whether, amongst these conditions, the architectural improvement of the present front, and its better adaptation to what the late Sir Robert Peel once termed the finest site in Europe might not be contemplated.

It was stated by Sir Charles Eastlake, and by other distinguished members of the Royal Academy, that although in 1859 they did not object, and might not object, if again proposed to them, to the site of Burlington-gardens, which they consider advantageous, they considered their psesent site as still preferable. No other site could certainly be selected that would invite so large a concourse of visitors, or be convenient to so many classes of persons. If the entire building in Trafalgar-square were given up to the Royal Academy, the existing accommodation might be more than doubled, and the Royal Academy would then possess sufficient space to enable it to carry ou t the high objects that are set before it.

Such a grant on the part of the nation, accompanied by a Royal Charter, and guarded by such conditions as we have here sketched out, would, we think, be found to work most beneficially.

The conditions and rules which we have indicated as essential would come to the Academicians accompanied by the boon of a vast increase of space and a greater fixity of tenure. We think, therefore, that the public would have a right to expect, on these terms, a ready and cheerful concurrence on the part of that distinguished body in these measures of amendment which we have proposed, and an harmonious working together of its members, old and new, towards their combined and noble object—the promotion and development of Art.

FRAUDULENT ASSUMPTION OF EXHIBITION AWARDS.

The efforts of the Committee formed at a meeting held at the Society's House, on the 18th June, have resulted in the passing of the following

Act to prevent false Representations as to Grants of Medals or Certificates made by the Commissioners for the Exhibitions of 1851 and 1862.

Whereas it is expedient to prevent false representations with respect to grants of medals and certificates by the Commissioners for the Exhibition of 1851 and the Commissioners for the Exhibition of 1862: Be it enacted by the Queen's most Excellent Majesty, by and with the

advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

I. If any trader commits any of the offences following; that is to say,

1. Falsely represents that he has obtained a medal or certificate from the Exhibition Commissioners in respect of any article or process for which a medal or certificate has been awarded by the Commissioners:
2. Falsely represents (knowing such representation to be false) that any other trader has obtained a medal or certificate from the Exhibition Commissioners;
3. Falsely represents (knowing such representation to be false) that any article sold or exposed for sale has been made by, or by any process invented by, a person who has obtained in respect of such article or process a medal or certificate from the Exhibition Commissioners;

He shall incur the following penalties; that is to say,

1. For the first offence he shall forfeit to her Majesty a sum not exceeding five pounds:
2. For any subsequent offence he shall forfeit to her Majesty a sum not exceeding twenty pounds, or be imprisoned for a period not exceeding six months.

II. In proceedings under this Act it shall not be necessary to prove that any person has sustained damage by the false representations of the defendant. It shall not be necessary in any proceedings under this Act to set out any copy or *fac-simile* of any medal or certificate.

III. For the purposes of this Act "The Exhibition Commissioners" shall mean the Commissioners for the Exhibition of 1851 and the Commissioners for the Exhibition of 1862, or either of such bodies of Commissioners. The term "Defendant" shall mean any person against whom proceedings may be taken under this Act.

IV. Offences under this Act may be prosecuted summarily in England and Ireland before two Justices; as to England, in manner by an Act passed in the sessions holden in the eleven and twelfth years of the reign of her Majesty Queen Victoria, chapter forty-three, intituled, "An Act to facilitate the performance of the Duties of Justices of the Peace out of Sessions within England and Wales with respect to summary Convictions and Orders," or any Act amending the same; as to Ireland, in manner directed by the Act passed in the session holden in the fourteenth and fifteenth years of the reign of her Majesty Queen Victoria, intituled "An Act to consolidate and amend the Acts regulating the Proceedings in Petty Sessions, and the duties of the Justices of the Peace out of Quarter Sessions in Ireland," or any Act amending the same.

In Scotland, an offence against this Act may be prosecuted summarily at the instance of the Procurator Fiscal before any Sheriff or Sheriff Substitute, or before any Two Justices of the County, or before the Magistrates or any Police Magistrate of the Burgh in which the offence was committed.

V. No provision of this Act shall take away, diminish, or prejudicially affect any suit, process, proceeding, right, or remedy which any person may be entitled to at law, in equity, or otherwise; nor exempt or excuse any person from answering or making discovery upon examination as a witness, or upon interrogatories or otherwise, in any suit or other civil proceeding: provided always, that no evidence, statement, or discovery which any person shall be compelled to give or make shall be admissible in evidence against such person in support of an indictment for a misdemeanor at common law or otherwise, or of any proceeding under the provisions of this Act.

VI. This Act may be cited for all purposes as "The Exhibition Medals Act, 1863."

PORTRAIT MUSEUM.

Photography stands in the foremost rank as a great civiliser; it enters into every grade of society, from the Queen on the throne to the peasant in his humble cottage; and it affords to those engaged in commerce a cheap and faithful means of distributing exact copies of their productions for the benefit of all. The most intricate mechanism is copied as easily as the most simple; the artist avails himself of its wondrous powers, as does also the architect; and the lecturer employs it with the magic lantern as the means of showing instantly to his audience places and things that, with the most eloquent tongue, he would be utterly unable to describe.

We have used it selfishly to supply our own wants, and oftentimes to gratify our own vanities. But we may, if we will, use it for a purpose far more noble than any it has yet been applied to. By its aid we may raise a monument to all men and women that are great and good, and one that shall be more lasting and far more truthful than the cold and unimpassioned marble; in fact, we can secure the perfect image of the human being instinct with life, and so preserve it that it shall be a monument for all time to his or her memory, that will afford to generations yet unborn the high gratification of looking upon those who have lived centuries before themselves, and who, by their patriotism and genius have helped to make the world what it is. What would we not give to possess faithful portraits of the illustrious dead? that we might look upon them face to face as they walked the earth. Had the art been known in the days of Socrates, Dante, or Shakspeare, we might have possessed photographs of these and thousands of others; but as we cannot raise the images of the mighty dead, we may preserve for all time the illustrious living.

It will be asked how can all this be secured? Very easily, as will be seen from the following suggestion of Mr. Maclachlan:—Photographs, no doubt, at present are not to be depended upon as lasting memorials, but the original negatives are as lasting as the material (glass) upon which they are taken. The plan proposed is to secure the negative plates of great men, and have them placed in a museum for safe keeping, properly authenticated, attested, and registered by the mayor or other authority of the place where they were taken; and, to provide against accidents, it is proposed to secure in every instance, three plates of the same individual, which can easily be done, as the original one can be always reproduced at pleasure.

The object of securing three plates is, that one may be kept within the institution, and the other two lent, at the discretion of the authorities in charge; for instance, to any author of eminence for book illustration; and by that means the memories and images of those who have been great and passed away would be transmitted faithfully to all posterity. In almost every instance there would be several portraits of the same individual in different museums in the country, affording a still greater security for their permanent preservation. All local celebrities might be taken in their own towns and deposited in the museums of their respective localities, and should a time arrive when their genius became acknowledged by the world, then they might claim a shrine in our great National Museum. There would necessarily be a few simple rules to guide us in the selection of the proper kind of plates to deposit, which it is needless to enter into here.

Portraits can be taken so small that thousands of them would not occupy one square foot, and at the same time could be enlarged to life or any other size at pleasure.

As to cost:—Mr. Maclachlan offers his best services in photographing any persons who may be deemed worthy, esteeming it an honour, and he believes his brothers in the art would assist as freely as himself.

The space required for the due preservation of these negatives is very small. As many as five or six thousand could easily be stowed, ready for reference at all times, in a couple of presses of ordinary size.

PETROLEUM GAS.

The following report is from Mr. George Bower, of Huntingdonshire, gas contractor to the Duke of Marlborough, the Earl of Shrewsbury, Viscount Hill, &c. :—

Having had a large quantity of crude petroleum oil placed at my disposal by Mr. A. S. Macre, of Liverpool, for the purpose of ascertaining its gas yielding properties, and also whether it could be used along with common coal, wood, or peat, for the purpose of enriching the gases made from these substances, so as to compete with boghead, which is the material now generally used, I am now enabled to make the following observations :—

Before giving the results of the experiments, I think it right to describe the apparatus which I have constructed purposely for these experiments.

The retort is double-acting, four feet long, and of this shape in section 8, and known as the Fitzmaurice retort, the principle being that of the regenerative system, as practised by Malam some 40 years ago, but with this difference in construction—Malam had two retorts, a large and a small one, set one over the other, the coal being placed in the large retort in the bottom, the vapours passed through the smaller one at the top, and those which were not permanently gaseous were made so by their passage through this highly-heated surface.

Although by this process the yield of gas was increased per ton of coals distilled, yet it was at the cost of both the illuminating power, wear and tear, and fuel—in short, the cost was greater than the value of the larger product, and so did not obtain extensive use. This system was applied to coal gas, which of itself has only a moderately illuminating power; and though some of the tarry vapours were arrested, yet the second application of heat to the already formed gas deteriorated its illuminating properties, by causing it to deposit carbon, and thus more than counterbalanced the advantage of an increased yield. The evolution of gas from coal in an ordinary retort is a slow and gradual operation, the outside being first acted upon; and hence it requires six hours to obtain the whole of the gas from 1½ cwt. of coal, with which the generality of retorts are charged; but with oil the vapour is evolved so rapidly, that without a considerable surface for it to pass over, a very great portion of it would be condensed into a thin black tarry oil; hence the advantage of the Fitzmaurice retort, which is also equally adapted for coal, wood, or peat, and the gases from which can be enriched with oil.

It has been a common practice in making gas from oil, to fill retorts with coke, broken bricks, or any material which will give surface, and the oil has been dropped or run into them, or made to traverse through them; but this seems to be a very effective way of absorbing the carbon, to which all gas owes its luminiferous property. The result of a great number of experiments has made me determine that a high heat with a large surface is the very worst plan that can be adopted for making gas from oil; but that in order to get the best results, a moderate heat—dull cherry red by daylight—and the double form of retort without anything in it, give the best results; not for volume of gas, but for quantity of light; in other words, there is more light from 80 cubic feet of gas produced in accordance with the latter plan from the gallon of oil, than from 160 feet produced according to the former made from the same quantity.

The test of the apparatus is the same as for ordinary coal, excepting that no purifier is required; but the condenser has double the surface of that for coal, on account of the rapidity with which the gas is evolved. A meter to measure the quantity of gas produced, and a gas-holder, complete the apparatus.

Two qualities of oil were supplied to me by Mr. Macrae, one of specific gravity ·805, the other ·910; water being 1.

It may be stated that the higher the specific gravity of the oil the better the yield of gas, and the heavier it is the greater the heat required to get the best results.

I now proceed to consider the cost of gas from petroleum oil, and how far it may be used for this purpose.

The present price of the lighter of the two oils is about 1s. per gallon. I will dismiss the heavy oil, and confine my remarks to that of specific gravity ·805, as it is, upon the whole, more economical to use than the other.

With the present prices of oil the gas cannot be other than very costly, when compared by volume alone against ordinary coal gas; but when all the collateral advantages are taken into consideration, and a comparison instituted upon the basis of quantity of light from equal volumes, then the contrast is not so marked.

The advantages which oil gas has over coal are in the fact, that it requires no purification, being absolutely free from impurities; hence it may be used in the most sumptuously decorated saloon, library, or picture gallery, without the slightest fear of its injuring anything whatever; the process of making the gas is much more simple, the apparatus to produce an equal quantity of light as that from coal is much less costly, and consequently the wear and tear is also less; and not only is a less quantity required for an equal amount of light, but the heat is considerably less than from coal gas.

If the comparison be made as between coal and oil, coal undoubtedly makes the cheaper light by far; but, if it be instituted as between tallow and oil, as ordinarily burnt in lamps, then the light from petroleum oil gas is very much less costly than from either of them.

One ton of oil will produce as much gas as will give the light of that produced from good Newcastle coal; thus where carriage forms the chief item of the cost of the material at its destination, oil may, in such a case, enter into favourable competition with coal; or, where the first consideration is purity, and to have a gas which, light for light, shall be more brilliant and powerful than the oil burnt in the solar and moderator lamps, then not only is petroleum superior, but also of considerably less cost.

His Royal Highness the late Prince Consort took great interest in portable gas, and I have in my possession a vase which he had made specially for his own use to contain compressed oil gas. One foot of oil gas will give the light of three feet of ordinary coal gas, and though gas, under very high pressure, loses some of its luminous qualities, yet it may be condensed at fifteen atmospheres, and thus become perfectly portable; so that beginning with a gas of three or four times the illuminating power of common coal gas, and condensing a given volume into a fifteenth of its bulk, there is in this fact alone a large field for the use of oil gas for the lighting of railway trains, ships, private carriages, and country houses, where it may not be feasible or policy to erect small gasworks for the supply of gas at ordinary pressures. For instance, the Albert vase already alluded to is of a capacity equal to half a cubic foot, and if charged with oil gas compressed to fifteen atmospheres, it will then deliver seven feet, and as this is, to begin with, three times more powerful than common gas, its effect will be equal to twenty-one feet, and will give a light equal to six or eight candles for seven hours.

The daily cost of petroleum oil gas, when made to supply one hundred lights burning for six hours, each light being equal to eight candles, is as follows :—

	£	s.	d.
15 gallons of oil, 1s	0	15	0
Coke to heat the retorts, 3 cwt., 1s. . .	0	3	0
Labour—part of a lad or man's time . .	0	1	6
Wear and tear	0	0	9
Interest on capital	0	0	4
Fund to maintain plant in perpetuity	0	0	6
Net cost of 1,200 cubic feet .	£1	1	1

This is about five times what coal gas would cost made on the same scale; but as the illuminating qualities of the

1,200 cubic feet are equal to about 3,500 of ordinary coal gas, the oil does not compare very unfavourably when everything is taken into consideration, so that if the gas be required only for lighting purposes, and not for cooking or heating (for which it is totally inapplicable), then there are very many who will doubtless prefer paying a high price for oil gas, in order to get a light which is absolutely pure, and which, though not nearly so cheap as ordinary coal gas, is nevertheless infinitely cheaper than oil, tallow, or wax, as ordinarily burnt, and without their inconveniences.

The supply of oil in Pennsylvania and Canada, in Moldavia and Wallachia, is practically exhaustless; and as the means of transport to the shipping ports are increased, so will probably the price be reduced, though every day almost is adding a new product obtainable from it, so that it may be some time before the price will be materially reduced.

ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

At the meeting of the Executive Committee of this Association, May 26th, 1863, Mr. L. E. Fletcher, chief engineer, presented his monthly report, of which the following is an abstract:—

During the past month there have been examined 257 engines—1 specially; 420 boilers—10 specially, 11 internally, 77 thoroughly, and 322 externally, in addition to which one of these boilers has been tested by hydraulic pressure. The following defects have been found in the boilers examined:—Fracture, 8 (3 dangerous); corrosion, 22; safety-valves out of order, 1; water-gauges ditto, 11; pressure gauges ditto, 6; feed apparatus ditto, 2; blow-out apparatus ditto, 3; fusible plugs ditto, 1; furnaces out of shape, 2 (1 dangerous); over pressure, 2 (both dangerous); blistered plates, 2 (1 dangerous); total, 60 (7 dangerous). Boilers without glass water gauges, 2; without pressure gauges, 5; without blow-out apparatus, 17; without back pressure valves, 34.

The occurrence of explosions during the past few months has been so frequent that the reports of their details have prevented any notice of the defects found to exist in the boilers under inspection, further than that given in the monthly list as above; and, therefore, the present opportunity may be taken for some slight amplification.

Serious cases of corrosion continue to be met with at the bottom of those boilers which are set upon brick mid-feathers, running underneath them from one end to the other along the centre or keel line. In this mode of setting, any water which may fall upon the boiler, or leak from the seams, trickles down the shell, and settles on the top of the mid-feather, in contact with the plates. Also where damp exists in the flues, it easily rises through the mid-feather and reaches the boiler. Corrosion may be going on along the centre of the mid-feather and not be visible at the sides, and thus pass undetected even on careful examination—several instances of which have recently been met with.

In one case, a boiler 10 feet 5 inches in diameter, and of plates seven-sixteenths thick, was found, upon the removal of the brickwork, to be deeply channelled for a width of six inches along the bottom at the centre of the seating, no indication of which was given at the sides of the wall, nor was it detected by hammering internally, but remained unknown until the removal of the brickwork. In another boiler, the shell of which was 8 feet 2 inches in diameter, and three-eighths in thickness, the plates were found to be channelled longitudinally along the centre of the mid-feather for a width of eight inches. The seating was fifteen inches wide, and the channel died out at three inches from the outside, thus giving no external sign. In a third boiler, the flues of which were damp, the whole of the plates in contact with the mid-feather were found to be corroded, and as much as a quarter of an inch in thickness eaten away. Other instances might be adduced, but the character of the injury is so similar in each case that it would be tedious. Those already given will show the grounds upon which the following recommendations are made:—

First: Wherever it is practicable to do so, dispense with mid-feathers altogether, and substitute what are termed two side walls for them. Second: In those cases where the small size of the boiler forbids this, make the bearing surface of the mid-feather wall as narrow as possible. Third: Any that must be retained in use, should, in preparation for annual "thorough" inspection, be removed—at least where in contact with the transverse seams of rivets—in order to admit of complete examination.

Further cases of corrosion may be mentioned occurring to other boilers than those set upon mid-feathers.

A tubular boiler, without any external flues, was found so deeply channelled at the bottom of the shell at the transverse seams of rivets, that the plates were reduced to the thickness of a sheet of paper, and a hole knocked through them in sounding their strength with a hammer. A second boiler, of ordinary double furnace, internally-fired construction, was so eaten away by corrosion at the first bottom plate from the front, that, as in the preceding case, a hole was made on examination; the corrosion being due to leakage from the glass water gauges and mudhole joint, as well as to the practice of slacking the ashes while lying at the front of the boiler. In another case, where the cross wall below the front end of the boiler was as much as two feet in thickness, the plates were corroded nearly through. So great a thickness as two feet for these walls is quite unnecessary, as well as objectionable, and it is recommended that they should be removed periodically for the examination of the plates.

Several cases have been met with during the past month of injury occurring to externally-fired boilers at the parts immediately over the furnace, the plates bulging, cracking at the rivet holes, and the seams straining and leaking. One of our members has contributed a sample plate cut out from a boiler of this class, which is bulged down at the solid, and cracked completely through, although the boiler was amply supplied with water; this plate is a fair sample of the danger of the externally-fired class.

A safety-valve, the spindle of which passed through a bushed hole in the cover, was found to fit so tight as to be quite fast. This bush had been fitted to prevent the inconvenience arising from the escape of steam, under the impression that a safety-valve was unnecessary, as long as the boiler was provided with a steam pressure gauge.

A report relative to explosion No. 9, recorded in the last month's abstract, has since been received from an engineer who examined the boiler shortly after the explosion had occurred, and from which it appears that the boiler, which was of plain cylindrical egg-ended construction, and externally fired, had rent—as is so constantly found to be the case in this class—at the transverse seams over the fire, the shell dividing into two parts, which were thrown some distance asunder.

One boiler only, and which was not under the inspection of this association, has been reported to have exploded during the last month; the explosion occurring at too great a distance from Manchester to admit of a personal investigation. Should any particulars of interest be ascertained, they will be communicated in the next monthly report. The explosion will rank as No. 10 in this year's list.

LIGHTING THE BRITISH MUSEUM BY GAS.

The following is extracted from Professor Levi's "Annals of British Legislation":—

Several questions were put by the Trustees of the British Museum to Mr. Braidwood, the Superintendent of

the London fire-engine department, respecting the illumination of that building. To the question whether the British Museum could be safely lighted up in the evenings, he said, "You do not state whether the proposed lighting is to be effected by candles, oil, or gas. Lighting might be effected with candles or oil with comparative safety under good management, but if the building is to be lighted by gas the question assumes a very different aspect. In the first place, the use of gas desiccates everything within its reach, especially all ceilings, roofs, &c., which are placed above the lights, thus rendering them much more inflammable than they otherwise would be, making what would otherwise be a trifling fire a serious conflagration. In the second place, the heat and fumes evolved by the combustion of gas are most decidedly against the preservation of any vegetable or animal substances, and tend to discolour stone, marble, &c., in such a manner that it is very difficult to restore the original colour. This is stated on the supposition that the Museum is to be lighted by single argand lights, but if what are called 'sun' burners are used the risk will be immensely increased. The sun burner consumes a very large quantity of gas at one point, causing an intense degree of heat, which has to be carried off by pipes, a process difficult of performance with perfect safety in a building constructed with so much inflammable material as the Museum. Several fires have been occasioned by their use. I would therefore consider these lights as totally inadmissible in the British Museum. Independent of these risks is the danger of explosion to which every place where gas is used is liable, notwithstanding the accuracy with which the fittings may be executed, and it must not be forgotten that the more substantial the building is, so much more destructive is the explosion." To the second question, "Do you consider that it would render extensive alterations in the building necessary?" Mr. Braidwood answered, "It does not appear to me that extensive alterations would be necessary for the introduction of gas, but the floors, ceilings, and walls would be very much cut about, and a heavy expense incurred." And to the third, "Do you consider the risk, supposing there is any, equal in all departments?" he answered, "I believe the risk to be such that on no consideration should a building intended to last for ages, and containing such invaluable property as the British Museum, be subjected to it. The relative risk of the different departments will vary according to the structure and contents of each. Thus those parts which are most solidly constructed and of the heaviest materials will suffer most in case of an explosion, and those departments where there is a greater quantity of combustible materials in the structure and contents will, when such materials are sufficiently dried and prepared for burning, suffer more severely from any trifling accident which may take place, and which but for such desiccation of the materials around would have passed off without much damage or observation. I have always disliked the small hot-water pipes used to heat the British Museum; although they are very carefully placed in slate troughs, &c., several trifling accidents have occurred from them. If such accidents were to occur after the surrounding timber had been dried up by gas for some years, the result might be much more serious. I would also beg to add that two firemen would be incapable of giving the necessary attention if the Museum were lighted by gas, and a considerable number of additional firemen must be employed."

In support of this opinion, Mr. Braidwood stated that Mr. Warrington, the chief chemical officer at the Apothecaries' Hall, agreed with him as to the destructive tendencies of the vapour evolved in the burning of gas, and was ready to give the chemical reasons if called upon. A similar opinion was elicited from Mr. Sydney Smirke, R.A., Architect to the British Museum, in consequence of which the Trustees, on the 13th April, 1861, came to a unanimous opinion that they would not be justified in allowing the collections of the British Museum to be open at any hour which would require gas light.

EXAMINATION PAPERS, 1863.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(*Continued from page* 606.)

ASTRONOMY.

THREE HOURS ALLOWED.

1. Define the axis of the earth and that of the heavens, also the poles of the earth and those of the heavens.
2. Define the equator of the earth and that of the heavens, and state why the latter is called the equinoctial.
3. What is the ecliptic? is it parallel to or inclined to the equinoctial?
4. What is the breadth of the zodiac and where is it situated?
5. What are the colures, and where are they situated?
6. Define longitude on the earth and in the heavens.
7. Define right ascension and declination of a heavenly body.
8. Define latitude on the earth and in the heavens, and state the latitude of the sun.
9. What is the orbit of a planet, and define the plane in which a planet moves.
10. What is the inclination of the orbit of a planet, and define the nodes of a planet.
11. What points in a planet's orbit are called Apogee and Perigee, and define the line of the apsides.
12. What is the difference between an apparent solar day and a mean solar day?
13. Define a Sidereal day and a Sidereal year.
14. What is a solar or tropical year?
15. How can the mean distance of the sun from the earth be determined?
16. The parallax of the sun has been considered as 8"·58; from observations recently made, it seems to be more nearly 8"·9. If the latter be correct, what change will have to be made in the sun's mean distance from the earth?
17. State in general terms the method of determining right ascension and declination of a heavenly body.
18. Explain the principles of a lunar eclipse, and state why we have not a lunar eclipse at every full moon.
19. What are the errors of a Transit Instrument? and deduce their numerical corrections.
20. Explain the aberration of light, and state its effect on a star's position.
21. Given, the apparent zenith distance of Mars' south limb:—

    As observed at Greenwich, 71° 33' 21"·5.
    The correction for refraction, 2' 54"·5.
    The correction for parallax, 10"·5.
    The latitude of Greenwich, 51° 28' 39"·0.
    And the semi-diameter of the planet, 5"·7.
    What is the North Polar distance of the planet?

CHEMISTRY.

THREE HOURS ALLOWED.

1. What weight of air is required for the complete combustion of a pound of carbon? What weight is required for the combustion of a pound of hydrogen?
2. What volume of hydrogen is required to form a cubic foot of each of the following gases or vapours, viz., hydrochloric acid, water, and ammonia?
3. Describe the preparation and chief properties of sulphuretted hydrogen. Explain, by an equation, the reaction by which the gas is liberated in the action of hydrochloric acid on sulphide of antimony.
4. How is iodine prepared? How separated from chlorine? How estimated quantitatively?
5. Describe the action of nitric acid at various degrees

of concentration on the following substances, viz., carbonate of baryta, metallic tin, and metallic zinc.

6. Describe the structure and composition of a flame of coal gas. By what contrivances can marsh gas be made to burn with emission of bright light, like that of olefiant gas?

Second Division.

1. What is the action of hydrochloric acid on the following metals, viz., antimony, tin, bismuth, lead? How does sulphuric acid act upon these metals?

2. Describe the composition and properties of some of the most important alloys of copper.

3. What would you do with a black precipitate, formed by sulphuretted hydrogen in a strongly acid solution, in order to ascertain its composition?

4. How is metallic aluminium prepared? Describe its characters, also those of its salts.

5. How is lime distinguished from baryta? How are the two bodies separated quantitatively?

6. Describe the manufacture of soda. What are its chief impurities, and how are they detected?

Third Division.

1. What are the chief products besides alcohol which are formed in vinous fermentation?

2. How is glycerine best obtained in a state of purity? Give its formula and its chief reactions.

3. How is gun cotton prepared for photographic use? What differences of its properties can be produced by modifications in the concentration of the acid?

4. How is benzole obtained from benzoic acid; how from coal tar? What is its boiling point? What is the action of nitric acid upon it?

5. How is lactic acid prepared from sugar? Give its formula and chief reactions.

6. Describe and explain Liebig's combustion apparatus. How do you calculate the formula of an organic body from the results of a combustion?

ANIMAL PHYSIOLOGY IN RELATION TO HEALTH.

THREE HOURS ALLOWED.

1. Describe the structure, general and microscopic, of a living human canine tooth. Explain how a tooth is formed, how it grows and lives, what are the uses of the teeth, and how their decay and loss may affect the animal economy.

2. State in general terms the chemical composition of milk, beer, wine, alcohol, coffee, and tea; and also, so far as is known, their respective actions as articles of food.

3. Describe the source and chemical nature of the gastric juice. When is it formed; and what circumstances may favour, and what impair, its healthy formation and action?

4. Mention the ingredients and composition of ordinarily pure atmospheric air, and the changes it undergoes in respiration. Afterwards give what information you can as to the particular change which makes air so respired less and less fit for further breathing—the rate at which it becomes deteriorated in one and successive respirations, and the point at which it becomes incapable of supporting the life of a warm-blooded creature.

5. Give some examples of the immediate and remote consequences to the human economy of breathing good or bad air.

6. Explain generally the function of excretion; the fundamental characters of the organs by which it is performed, the nature of the process itself, and its purpose in living animals or plants.

Illustrate the subject anatomically and physiologically, by special reference to the excretory apparatus and excretions of the skin.

BOTANY.

THREE HOURS ALLOWED.

The Candidate is expected to answer correctly six questions in Section I. and eight questions in Section II.; Nos. 11 *and* 12 *of the latter each standing for one answer.*

Section I.—(Vegetable Physiology.)

1. Describe the mode of origin and principal modifications of the *duct.*

2. Describe, in general terms, in order, from the centre to the circumference, the *Systems* and *Tissues* of which they are composed, laid bare in a transverse section of the stem of an *Oak.*

3. Out of what vital processes does the *liberation* of carbonic acid gas arise?

4. Name three plants affording *milk-sap* for economic use. In what tissue and in which part of the plant does it usually occur?

5. What is the function of the *Stigma?*

6. What is *Dry-rot?* How does it affect timber What circumstances *counteract* and what *favour* it?

7. Upon what does the success of a *graft* depend?

8. What is the function of the *root?*

Section II.—(Practical Botany.)

1. Name the two principal types of *aestivation.*

2. State the difference between *Spike, Spadix,* and *Catkin.*

3. What is meant by *Cohesion* and *Adhesion?*

4. What is the *Connective?*

5. Distinguish *Dipsaceæ* from *Compositæ.*

6. Describe the *fruit* of *Umbelliferæ,* and its principal modifications.

7. Give the diagnostic characters of the natural order *Cruciferæ.*

8. Describe the structure of the *Ovary,* and of the *fruit* of *Quercus* and *Corylus.*

9. How does *Rye* differ from *Barley?*

10. Give the natural orders of the plants marked A, B, C, D, with reasons for your opinion.

11 and 12. Describe the two plants now placed before you strictly according to the form given in "Descriptive Botany," chap. vii.*

(To be continued.)

Home Correspondence.

RESIDENCES OF CELEBRATED MEN.

Sir,—With regard to Mr. Henry Cole's proposition that the Society of Arts should take up the matter of marking the residences of remarkable men, it does seem more in the way of the Board of Works, who name and number the streets, altering, not always wisely or with good taste, with but little respect for priority or historical right. In some cases the Society of Arts might aid, if not take the initiative, though I would mention, for their edification, that several artists having wished to place a marble tablet on the house in which J. M. W. Turner was born and lived, in Maiden-lane, Covent-garden, subscribed a sum for that purpose, but on application to the Board of Works were refused permission. The money collected was presented to the fund then forming in aid of the family of the late John Cross, whose works were exhibited in the Great Room in the Adelphi—a fund that I am happy to say (with the Royal bounty and other aid) has placed that artist's family in ease and comfort. Thus the Turner tablet fund was merged into the Cross fund as the best available way of winding up that memorial.

I am, &c., JOHN LEIGHTON.

July 27th, 1863.

* Any two plants, in flower, may be taken by the Local Examiner, he reporting their names to the Society of Arts when he returns the Candidates' papers.

Proceedings of Institutions.

Metropolitan Association for Promoting the Education of Adults.—The Committee of this Association have issued the following notice of the Examinations in Religious Knowledge for 1864:—Second Annual Examination in Religious Knowledge, 1864; examiner, Rev. A. Blomfield, M.A. The Annual Examinations in Religious Knowledge are held under the direction of the Lord Bishops of London and Winchester, who appoint the examiner, and award the prizes and certificates. Every candidate must be at least twelve years of age, and must have previously received from this Association, or from a Local Board connected therewith, or with the Society of Arts, a certificate or pass for proficiency in Elementary Knowledge. The second annual examination will be conducted by the Local Boards of the Association on Tuesday evening, May 10th, 1864. Syllabus, lower grade:—1. Order of Morning and Evening Prayer and the Church Catechism. 2. The Gospel of St. Luke. 3. The First Book of Kings. Higher grade. 1. Order of Morning and Evening Prayer and the Church Catechism. 2. The Office for Holy Communion. 3. The Gospel of St. Luke. 4. The First Book of Kings. The questions will be so framed as to elicit a knowledge of the leading facts of Scripture History. Candidates are allowed to select either grade at their discretion. All candidates who pass a satisfactory examination will receive a certificate signed by the Bishop of the diocese. The following prizes are also offered to the most successful candidates:—Higher grade. First prize, books to the value of £3; second prize, books to the value of £2; third prize, books to the value of £1 10s. Lower grade. First prize, books to the value of £1; second prize, books to the value of 10s. Candidates will be allowed to select books to the amount of their respective prizes from a list of works sanctioned by the Society for Promoting Christian Knowledge. Paid teachers are not allowed to compete for the prizes. The name of each candidate must be given to the Secretary of the Local Board at which he proposes to present himself, on or before May 1st. Further information can be obtained of the Secretaries of the Local Boards, or of the Secretary of the Association, 19, John-street, Adelphi.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on the 11th and 13th July, 1863.

411. Metropolitan Board of Works—Copy of Letters, &c.
418. Municipal Boroughs (Ireland)—Paper.
425. Anchors and Chain Cables Bill—Copy of a Letter.
422. Judgments (Courts of Common Law)—Return.
330. Finance Accounts—Classes 1 to 7.
204. Bills—Charitable Trusts (Ireland).
222. ,, Waterworks Clauses (amended).
225. ,, Volunteers (Lords' Amendments).
226. ,, Regimental Debts, &c. (Lords' Amendments).
223. ,, Poisoned Grain, &c., Prohibition (amended).
224. ,, Church Rates Recovery.
Poland—Correspondence (Part 3.)
Public General Acts—Caps. 30, 31, 32, 33, 34, 35, 36, 37, and 38.

Delivered on 14th July, 1863.

417. Trecastle National School—Return.
423. Patent Law Expenses—Return.
434. Cape of Good Hope Mails—Draft Contract.
227. Bills—Turnpike Trusts Arrangements.
228. ,, Turnpike Acts Continuance, &c.
Brazil and River Plate Mails—Contract.
Distinguished-Service Colonels, &c.—Report of Commission.

Delivered on 15th July, 1863.

429. Police (Counties and Boroughs)—Return.
437. Dov r and Ostend Mails—Copy of Correspondence.
433. Atlantic Royal Mail Steam Navigation Company—Further Papers.
439. West India Mails—Draft Contract.
229. Bills—Companies Clauses—Amended.
231. ,, Nuisances Removal Act (1855) Amendment (as amended in Committee and on Re-commitment).
232. Bills—Jurisdiction of Justices.
234. ,, Pauper Lunatic Asylums.
235. ,, Petty Sessions (Ireland).
236. ,, Union Relief Aid Acts Continuance (amended).
North America (Foreign Enlistment Act)—Memorial from certain Shipowners of Liverpool.

Delivered on 16th July, 1863.

414. Quartermasters—Return.
415. Caledonian Canal—Fifty-eighth Report of Commissioners.
421. Paupers (Scotland)—Return.
436. Public Income and Expenditure—Account.
438. Canada and British Columbia—Return.
187. Bills—British Columbia Boundaries.
230. ,, Railway Clauses (amended).
237. ,, Colonial Letters Patent.
238. ,, Expiring Laws Continuance.
239. ,, Land Tax Commissioners' Names.
240. ,, Petty Offences.
241. ,, Telegraphs (with the Amendments made by the Lords).
233. ,, Statute Law Revision.
Transportation and Penal Servitude—Report of the Commissioners (Vols. 1 and 2).
Colonial Possessions (West Indies and Mauritius)—Reports (Part 1).

Delivered on 17th July, 1863.

188 (1.) Militia (Ireland)—Further Returns.
431 (A.) Poor Rates and Pauperism—Return (A.)
385. Private Bill Legislation—Report and Minutes of Evidence.
440. London (City) Traffic Regulation Bill—Minutes of Evidence.
242. Bills—Partnership Law Amendment (as amended by the Select Committee, and on Re-commitment).
243. ,, Naval Medical Supplemental Fund Society Winding-up Act (1861) Amendment (Lords Amendments).
244. ,, Officers of Royal Naval Reserve (Lords Amendments).
245. ,, Public Works (Manufacturing Districts) (Lords Amendments).
246. ,, Thames Embankment (South Side) (Lords Amendments).
247. ,, Prison Ministers (Lords Amendments).
248. ,, Sheep and Cattle (Scotland) (Lords Amendments).
249. ,, District Parochial Churches (Ireland) (Lords Amendments).

Copies of the under-mentioned Papers, presented by Command, will be delivered to Members of Parliament applying for the same at the Office for the Sale of Parliamentary Papers, House of Commons:—

47. Turnpike Trusts (England and Wales)—Accounts, 1860.
48. Railway Accidents—Reports of Inspecting Officers (Part III.)

Delivered on 18th and 20th July, 1863.

430. Emigration—Returns.
433. Galway, Boston, and New York Mails—Draft of Contract.
442. Newcastle-upon-Tyne Trinity House—Return.
445. Holyhead Harbour—Report from the Committee.
451. Land Registry—Returns.
452. Population and Revenue—Return.
432. Dockyards and Steam Factories—Return.
441. Civil List Pensions—Paper.
350. Malta New Dock—Return.
413. Mhow Court Martial—Return.
242. Bills—Partnership Law Amendment (as amended by the Select Committee, and on Re-commitment).
243. ,, Naval Medical Supplemental Fund Society Winding-up Act (1861) Amendment (Lords Amendments).
244. ,, Officers of Royal Naval Reserve (Lords Amendments).
245. ,, Public Works (Manufacturing Districts) (Lords Amendments).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 24th*, 1863.]

Dated 27th March, 1863.

807. J. King, Chadshunt Farm, near Kineton, and T. H. Marshall, Combrooke, Warwickshire—Imp. in machinery and apparatus for preparing land for seed, and for harrowing land.

Dated 2nd June, 1863.

1375. G. H. Cottam, St. Pancras Iron Works, Old St. Pancras-road—Imp. in bricks suitable for being used for paving stables and other places.

Dated 17th June, 1863.

1519. F. De Wylde, Great College-street, Camden Town—An improved means for the protection and preservation of lead surfaces exposed to the action of water, and for the protection of such surfaces from decomposition by atmospheric action.—(A com.)
1522. A. Samuelson, 28, Cornhill—Imp. in apparatus for evaporating liquids.

Dated 19th June, 1863.

1540. W. Hicklin, Balls-pond—Imp. in metal screens and sieves for screening and sifting, applicable also to other openwork articles.

Dated 20th June, 1863.

1559. W. Clark, 53, Chancery-lane—Imp. in the treatment of broom for the manufacture of paper pulp. (A com.)

Dated 23rd June, 1863.

1578. W. W. Sleigh, London—A new method of obtaining motive power.

Dated 24th June, 1863.

1592. E. Myers, 2, Millbank-row, and W. R. Williams, 35, Lambs Conduit-street—Imp. in wet gas meters.

Dated 25th June, 1863.

1598. C. A. Count de Goddes de Liancourt, 19, Holly-street, Dalston —Imp. in apparatus for the preservation of life from drowning.

Dated 3rd July, 1863.

1654. W. E. Newton, 66, Chancery-lane—Imp. in the treatment and preservation of skins of all kinds.
1656. C. Baulch, Bristol—Imp. in the manufacture of boots and shoes.
1658. H. Thomas, Birmingham—An imp. or imps. in candlesticks.
1660. E. Lelios, Threadneedle-street—Imp. in the means of and apparatus for churning.

Dated 4th July, 1863.

1666. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in steam engines. (A com.)
1670. J. Oxley, Frome, Somersetshire—Imp. in filtering apparatus.

Dated 6th July, 1863.

1672. A. Gower and S. Gower, Market Drayton—An improved sowing and harrowing machine.
1676. J. M. Croft, 8, Abbey-road, St. John's-wood—Imp. in propellers for propelling vessels.
1680. G. C. Collyer, 152, St. George's-street-east—Imp. in the treatment of cut tobacco for its better preservation.

Dated 7th July, 1863.

1684. E. Edwards, Birmingham—Imp. in instruments or apparatus to be used in the manufacture of glass finger plates and other articles made of glass, and in kilns for annealing articles made of glass.
1686. J. Orr, Kidderminster—Imp. in weaving piled and other fabrics, and in the machinery or apparatus connected therewith.
1688. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus for milking. (A com.)

Dated 8th July, 1863.

1692. G. Haseltine, 12, Southampton buildings, Chancery-lane—Imp. in brick machines. (A com.)
1694. F. Ely, Totton, Southampton—An improved composition applicable to corn plasters.
1700. R. Tallerman and L. A. Tallerman, 131, Bishopsgate-street Without—A new method of waterproofing and ventilating boots, shoes, and slippers, for preventing wet and damp feet.
1704. J. Thomas, Battersea—Imp. in treating ores and earths containing iron in order to obtain the metal therefrom.

Dated 9th July, 1863.

1708. R. Phillipson and W. Bond, Accrington—Imp. in temples for looms.
1710. P. G. B. Westmacott, Newcastle-upon-Tyne—Imp. in cranes, and in dock gate and other crabs.
1712. P. G. B. Westmacott, Newcastle-upon-Tyne—Imp. in hydraulic engines.
1714. R. Agate, Hornsey—Imp. in the construction of skylights and rooflights for railway stations, conservatories, and other similar structures.
1716. W. Tent, Birchin-lane—Imp. in pins or hooks for suspending fabrics, dresses, or parts of dresses, curtains, and other articles of upholstery or apparel.
1718. W. Tasker, jun., Waterloo Iron Works, near Andover—Imp. in thrashing machines.

Dated 10th July, 1863.

1720. A. R. Johnston, The Grove, Yoxford, Suffolk—An improved portable fence for sheep and cattle pens or for other enclosures.
1722. J. J. Shedlock, 12, Abingdon-street, Westminster—Imp. in the construction of soil pits, and in the mode of emptying the same. (A com.)
1724. W. Clarke, Forest-road, Nottingham—Imp. in the manufacture of ornamental lace.
1726. R. Hornsby, jun., J. Bonnall, and W. Astbury, Grantham, Lincolnshire—Imp. in traction engines, and in apparatus for ploughing and tilling lands by steam and other power, part of which imps. is also applicable to driving or giving motion to machinery.
1728. W. Henderson, Kensington—Imp. in treating ores and other substances containing ores, in the manufacture of iron, steel, and alloys of iron, and of a purifying and deoxidizing agent therefrom, also in the construction of retorts or kilns for treating the said ores and substances.
1730. J. Campbell, Silvertown, Essex—Imp. in the permanent way of railways, and in supporting the rails thereof.

Dated 11th July, 1863.

1734. M. W. Ruthven, 72, Oxford-terrace, Hyde-park—Imp. in rudders or apparatus for steering vessels.
1736. J. Orr, J. Brinton, and J. Lewis, Kidderminster—Imp. in weaving "chenille," and in the machinery or apparatus connected therewith.
1738. R. A. Brooman, 166, Fleet-street—Imp. in cartridges for breech-loading arms. (A com.)

Dated 13th July, 1863.

1740. J. Mortimer, Hoxton hall, High street, Hoxton—Imp. in the construction and arrangement of dwelling houses in combination with the means employed for ventilating the same.
1742. H. Coulter, Liverpool—Imp. in the burners of hydro-carbon and other fluid burning lamps.
1746. R. S. Walker, High-street, Wapping—Imp. in sheathing or coating iron ships.

Dated 14th July, 1863.

1756. C. Opperman, King's-road, Peckham—Imp. in means or apparatus to facilitate the connecting and disconnecting horses and other animals with carriages.
1758. J. Holmes, T. Holmes, and F. R. Holmes, Norwich—Imp. in threshing and dressing machines.
1760. J. Davison, Southwick, near Sunderland—Imp. in furnaces for boilers, smelting, and other useful purposes.
1762. W. Wood, Monkhill, near Pontefract—Imp. in "warping" or covering land, bog, or peat, with earth or soil.
1764. W. Roberts, Lylands Twyford, near Winchester—Imp. in ploughs.
1766. J. Slater, Derby-villas, Park-row, Plaistow—Improved machinery for compressing bricks, tiles, and other plastic materials.

Dated 15th July, 1863.

1768. T. Wimpenny, Holmsfirth, Yorkshire—Certain imp. in machinery or apparatus for roving and spinning wool, cotton, and other fibrous substances.
1770. W. T. Cheetham, Ashton-under-Lyne—Imp. in obtaining hydraulic motive power.
1772. P. A. J. Dujardin, 29, Boulevart St. Martin, Paris—Imp. in electric telegraphs.
1774. R. A. Brooman, 166, Fleet-street—Improved means of and apparatus for reducing charcoal and other friable substances to fine or impalpable powder, particularly applicable to the manufacture of a substitute for lamp black. (A com.)

Dated 16th July, 1863.

1782. H. Elliott, Birmingham—Imp. in breech-loading fire-arms.
1784. L. R. Bodmer, 2, Thavies-inn, Holborn—The manufacture of a new product from peat and peat tar. (A com.)
1788. A. Montleart, Mildmay park, and W. Tent, Birchin-lane—An improved mode of attaching hooks to furniture or fabrics for suspending dresses or parts of dresses, fabrics, curtains, and other articles of upholstery or apparatus.
1790. O. Wakefield, 10, Union-place, Lambeth-road, Lambeth—Imp. in cocks or taps.
1792. E. Maw, Leamington—Imp. in the manufacture of pillars, posts, columns, mouldings, and buildings, when corrugated metal is employed, and in machinery used in corrugating, moulding, and shaping metal for such purposes.

Patents Sealed.

[*From Gazette, July 24th*, 1863.]

July 24th.

248. J. Oglesby, J. Dickinson, W. M. Dickinson, and J. Dickinson.
249. H. O. Cook & E. G. Terrey.
251. R. Ward.
254. W. Conisbee.
255. S. W. Francis.
258. C. P. Stewart & J. Robinson.
295. A. Forbes.
296. W. C. Barnes.
974. T. A. Weston.
1091. E. G. Brewer.

[*From Gazette, July 28th*, 1863.]

July 28th.

283. W. E. Gedge.
286. T. Bennett.
299. W. Clark.
310. J. Mellor.
315. J. J. Hays.
316. L. J. H. Marville.
324. J. Gill and J. Parkin.
334. A. Johnston.
339. J. Price.
362. T. Hill.
364. M. Wigzell.
367. W. Whitaker & W. Tonguo
396. S. Whitaker.
413. J. H. Johnson.
481. J. Brown.
499. J. Clay.
518. R. Maynard.
582. E. Habel and E. Suckow.
714. W. H. Emett.
749. G. Coles, J. A. Jaques, and J. A. Fanshawe.
1080. W. Rodger.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, July 28th*, 1863.]

July 20th.

1768. E. Hollis.
1770. W. Turner & J. W. Gibson.
1803. J. Pilkington.
1804. H. C. Ash.

July 22nd.

1775. R. Hewens.

July 23rd.

1823. J. Renshaw.

July 24th.

1811. L. Kaberry.

July 25th.

1887. J. Rives.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, July 28th*, 1863.]

July 21st.

1729. C. Amet.
1767. W. Wood.

July 22nd.

1742. J. Onions.

July 25th.

2124. P. A. Balestrini.

Journal of the Society of Arts.

FRIDAY, AUGUST 7, 1863.

SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

NOTICE TO MEMBERS.

In accordance with the Report adopted at the General Meeting held on the 17th ult., additional subscriptions for carrying out the Society's Memorial of His Royal Highness the Prince Consort are invited. Any member desiring to subscribe, or to increase the amount of his subscription, is requested to send a Cheque or Post-office Order, made payable to Mr. Samuel Thomas Davenport, the Financial Officer.

PRESERVATION OF IRON-PLATED AND OTHER SHIPS.

A process has been invented by Monsieur Jean Pierre Jouvin, Chief Medical Officer of the French Navy, and Professor of Chemistry to the Naval School of Medicine at Rochefort, "For Preserving Iron-plated and other Vessels and Metallic Articles from Oxidation, and Preventing Ships' Bottoms from Fouling." The French Government are now making trial of the process by covering two iron-clad vessels with the preparation.

The invention has been patented in England, and consists (as described by the inventor) in lining the inner surface of ships' sides and bottoms, perfectly scoured, with sheets or lamina of zinc applied directly against the sheet-iron, and there held fast between the latter and the frames. But as iron ships now afloat present some difficulty to the application of such zinc sheathing in the interior of their holds, the internal sides of the hold are first carefully scoured, and afterwards a double coat of a paint made of powdered metallic zinc is applied thereon, which is spread all over from the keel up to a little above the water line. As zinc paint, on account of the fatty matter it contains, does not act as an electric protector with the same efficiency as zinc when employed in the form of sheets, it is necessary to increase the area of the protecting surface.

For iron ships on the stocks, as soon as the keel, the stem, the stern-post, and frame are set up, they receive a thick layer of the aforesaid metallic zinc paint. The boarding of the keel and sides is afterwards proceeded with as usual, care being taken to apply underneath the timber employed a coat of the same paint, or in lieu thereof sheets of greasy felt thickly sprinkled with powdered metallic zinc. The zinc sheets are then applied without difficulty, and become bound with the sheets of iron of the streaks from the keel up to the water-line, and from the stem up to the stern-post, so as to form part with them. The sheets of zinc are held between the sheets of iron which form the stem and the keel, and, assuming the shape of the sheets to be protected form continuous bands extending right and left and from the bottom upwards, so as to meet again and join each other, between the sheet-iron forming the stern-post, and to have their ends in the vicinity of the helm and the water-line. As the rivetting takes place at a temperature higher than that of the melting of zinc, and approaching that at which this metal evaporates, part of the sheets around the heads of the rivets would be destroyed; to avoid this defect, the sheets of zinc must be of a sufficient breadth and length to cover the sheet-iron to within one-third of an inch of the rivets, without reaching them. The phenomena of dilatation could, therefore, freely take place on the preserving plates, the co-efficient of expansibility of these plates being nearly double that of iron.

For those parts of the zinc plates held between the frames and the sheet-iron, in order to insure a complete rivetting of iron on iron, it is necessary to begin by cutting washers or discs, by the ordinary means, in these bands opposite each hole of the rivets. The diameter of these washers must be double that of the rivets, and they are finally replaced by rings of sheet-iron, the diameter and thickness being equal to that of the bands of zinc. The covering bands and the heads of the rivets must receive a thick coat of metallic zinc paint. In the electro chemical scale, the protecting metal (zinc) coming immediately after the protected metal (iron), it will be advantageous to have the protecting surface as nearly as possible of the same dimensions as those of the surface to be protected. It is found that the protecting bands of zinc, if properly fixed from the keel up to the water line, may be only about two-thirds at maximum, and about one-tenth at minimum of the last surface, provided all the spaces between the zinc bands be covered with the metallic zinc paint. The zinc sheets should measure about one-fourteenth of an inch in thickness for the lower part, and about one-twenty-eighth of an inch for the sides of the hold. When the ship is built, all the parts of iron composing the hold—such as the ribs, keelsons, clamps, transversal bulk-heads, and others not covered by the zinc bands, are carefully scoured, brushed, or otherwise cleaned, and then coated with metallic zinc paint.

To protect the exterior part of the hull immersed from the deposit of marine sheets and plants, the inventor proceeds as follows: He states that turbith mineral (SO^3 $3HgO$) mixed with Prussian blue ($3Fe\,Cy + 2Fe^2\,Cy^3$) produces by its contact with the alkaline chlorides of sea-water, one of the most violent poisons known to mineral chemistry, namely—the cyanide of mercury ($Hy\,Cy$) in the shape of chloro-cyanide of mercury and sodium. He therefore first mixes fifty-five parts of turbith mineral with forty-five parts of Prussian blue of the commonest tint, but not adulterated, so as to obtain a green powder perfectly homogeneous, and composes the poisonous paint as follows:—Of boiled linseed oil, 250 parts; red lead (or any other agent which may cover or adhere as well or better than red lead), which is here used as a mere vehicle for the poisonous compound, 650 to 660 parts; the hereinbefore described mixture, 90 to 100 parts. These substances must be well ground together in order to effect an uniform and complete distribution of the poisonous compound throughout the mass of the paint. But as iron possesses the property of reducing mercurial and leaden compounds, this preparation must not be applied direct on the bare metal, all the parts of the hull, namely, the sheet-iron of the keel, cut-water, rudder, paddle-wheel frames, and every part of iron to be immersed or wetted, must be previously coated with two layers of the metallic zinc paint, after being scoured as completely as possible. When these layers of metallic zinc paint are quite dry, the poisonous compound or paint is applied thereon. This poisonous compound may prove also very advantageous if applied to wood employed to secure dikes, embankments, and for marine constructions to protect them from injury by teredos. The smallest particle of the chloro-cyanide of mercury and sodium produced by its contact with sea salt, suffices to kill instantaneously animalculæ, plants, and even their germs when brought within its influence.

To apply the invention to iron-plated vessels, there must either be placed between the woodwork of the hull and each iron plate a sheet of zinc, the surface of which is rather smaller than that of the iron plate, or this woodwork must be first coated with a thick layer of metallic zinc paint; then each iron plate, previously well scoured, is similarly painted on its inner face, and adapted to the

sides of the ship. The ship being finished, the whole of her bottom to be immersed in water is treated in the manner before described, that is to say, first coated with a double layer of metallic zinc paint, and afterwards with the poisonous compound paint. To preserve sheet iron tanks, marine boilers, steam engines, and other similar articles from oxydation, the inventor either applies on them externally zinc sheets, or coats them with a double layer of the afore-mentioned metallic zinc paint.

To preserve the parts of cables and chains stored in wells, where they are oxydised very rapidly, a band of zinc is fastened by screws on each of the rings or links. The metallic zinc paint may be applied to iron articles in general, wherever red paint is now made use of, and as a substitute for it. For ships' bottoms with a copper sheathing, before the sheathing is applied the woodwork is coated over with a thick layer of metallic zinc paint. But in the present case it is more economical to employ powdered cast iron, or, in preference, iron powder, instead of zinc powder, to prepare the metallic protecting paint, as it will protect copper as effectually. Should it be found, however, that the copper sheathing gets foul with barnacles and sea weeds, it must be coated with the poisonous compound before mentioned.

NATIONAL MUSEUM OF ARCHITECTURE.

The following is a report from the Council of the Architectural Museum to the Department of Science and Art. on the formation of a National Museum of Architecture:—

The Council of the Architectural Museum begs, in compliance with the intimation conveyed by the Committee of Council on Education, of the date of December 11, 1862, to submit the following considerations on the formation of a National Museum of Architecture in London. In doing so the Council feels itself absolved from the necessity of proving the desirability of such a Museum. The only questions about which there can be any difference are those which concern the details of a measure which in itself meets with universal approbation.

I. The first point which must be settled is the nature of the museum. All museums may be divided into two classes, which, for want of better terms, may be called exhibitional and scholastic. An exhibitional museum is one of which the primary use is the display of a collection or collections in given branches of art and science, brought together with a view to the completeness of the collections in themselves, and not for the purpose of direct instruction. Valuable, or rather indispensable, as such museums are for the purpose of study, yet their scholastic use is a secondary and not a direct one. They exist, indeed, for the student to profit by, on his own responsibility, but they were brought together for the sake, so to speak, of their contents, rather than for that of the visitor. The British Museum and the National Gallery are instances of exhibitional museums.

A scholastic museum, on the other hand, is one which has been constituted for the scholar; and the selection of specimens is made with a view to his direct instruction, rather than to the completeness of the objective display. The staple of an exhibitional museum must always consist of original objects; a scholastic museum admits of, or rather invites, models, diagrams, and *fac-similes*.

The Council of the Architectural Museum is convinced that the National Museum of Architecture must be mainly scholastic. Within what limits it would be desirable to make it also exhibitional will be noticed farther on in the report. It must at the same time be noted, that while the museum will profitably stand open to the studies of the architect who is engaged in the elaboration of his details, it will be still more useful to, and more frequently used by, the architectural artist, whether he is composing for himself, or merely carrying out the working drawings which have been placed in his hands. It will, as far as its more conspicuous contents are concerned, rather be a museum of architectural art, than absolutely one of architecture.

II. The next consideration is that of the limit of the collection, both as regards the sweep of subjects to be included under the definition architecture, and as regards the various styles of constructive art which it is desirable to illustrate.

While it is very easy to define what is painting, and not perhaps very difficult to attain a proximate definition of sculpture, the limits of that wide field which architecture may be said to fill to the exclusion of cognate arts, are almost undecipherable. The difficulty of attaining a right understanding on this head, in regard to a National Musuem of Architecture, is increased by the consideration which the Council ventures to assume as axiomatic, that the collection must rather be one of the details than of large proportions of buildings, and that those details must be selected for the beauty of the architectural art which they display. In other words, a National Museum of Architecture must, to a great extent, be a sculpture gallery. It is useless to attempt to evade this truth. If it is admitted, the question passes from abstract to practical considerations, and it becomes one of expediency. It is accordingly submitted, that the Museum of Architecture, properly speaking, should, on grounds of expediency, stop short of objects of which, from their moderate size and portability, fine original specimens can and may be displayed elsewhere in London in exhibitional museums, or which from their peculiar contexture ill admit of being copied. The first head excludes portable furniture; triptych pictures, small articles of metal work, ivories, textile fabrics, and, partially, ceramics.

III. It follows from the premises already recited that the contents of the museum should rather be whole-size casts of peculiarly meritorious specimens of architectural ornamentation, than reduced models of entire buildings, or of large portions of buildings. The Council does not of course mean to say that models should be excluded. They have their own great and distinctive value in connection with the casts as keys to the relevancy and position of the details exhibited at large, as well as for the amount of direct teaching which they may convey as to the general character and proportions of the buildings which they pourtray. Still the position of models (unless they are made on a large scale and with the most extreme accuracy) in the cycle of systematic and direct architectural teaching, must always be somewhat subordinate; their distinctive and especial value is as guides to the architect and the employer during the actual process of construction. It is needless to observe that such models as the one which Wren prepared of his first sketch for St. Paul's, now at South Kensington, have an historical value in themselves which removes them from the merely practical considerations which have just been urged.

Happily, modern science has intervened to provide completely and inexpensively the needful compliment to the collected whole-sized casts, by the discovery of topography. It is impossible for an architectural museum to have too many photographs. Cheap and comprehensive as they are, they are always worth collecting, and any fastidiousness as to their acquisition would be misplaced. Plans and measured drawings are also of great value, and no museum of architecture would be complete without its ample store of them.

As to the objects which may appear in the form of plaster casts, all ornamentation in stone (whether sculpturesque or not) is admissible, including such statues as are introduced as parts of architectural composition. So are the casts of such specimen woodwork as, in modern parlance, would be termed fixtures—such as panelling, church stalls, &c., and to a certain extent those which reproduce the details of important articles of portable furniture. Similar discriminative principles will decide what

objects of metal-work do, and what do not, admit of being cast for the purposes of the museum.

The above suggestions lead up to the direct question of what should be the styles of architecture admissible at the museum. The answer appears to be that all nations and ages should be represented which possessed an architecture based on scientific or artistic principles, but that the largest portion of the museum should consist of examples of the styles which have, generally speaking, been reproduced in modern architecture. These styles briefly recapitulated are the Greek, the Roman, the Romanesque, the Pointed, and the various forms of Renaissance. An architectural museum, confined to any one of these styles would be, as far as it went, valuable; a national collection must represent all if it is intended to be complete, while the limitations which have been offered as to the selection of examples are equally applicable to all the styles, should the museum, or should it not comprise specimens of contemporaneous architectural ornamentation. The truth appears to be that, speaking abstractedly, contemporaneous architecture must be admitted if the collection is to be accepted by future generations as an adequate exponent of architectural history. But the difficulty of selection is the obstacle, for a crowd of mediocrities admitted through favour or fashion would be a misfortune to art. On the whole, it is best to say generally that contemporaneous architecture is admissible, and at the same time to throw the responsibility of selection upon the managers of the museum. As to the admission, however, of photographs of contemporaneous buildings, there need be no limit, for it will always be possible to store them, and the larger the collection is the more valuable will it be for purposes of reference. There is hardly a new building now undertaken which is not photographed at the instance of the architect or of the employer, and an understanding might easily be established that it was expected that a photograph of every new construction, possessed of any architectural character, should be deposited in the national collection.

The National Museum of Architecture has hitherto been treated exclusively in its scholastic aspect, but it will possess an exhibitional character as the central place of deposit for the many valuable fragments which are let loose by excavation, demolition, restoration, sale, or gift. It would, however be a great mistake to make the admission of such antiquities too easy, as such a course might lead to the wholesale mutilation or destruction of monuments which would otherwise have been preserved intact or placed in durable repair. Worst of all the opening of such asylum might tend to the encouragement of that destructive system of restoration which has become so fashionable in France, and which consists in refabricating every portion of every ancient building which has been in the least degree disintegrated by time and weather. If there were a national museum open to receive the original pieces, a strong temptation would be thrown into the way of our own restorers to commit similar enormities. Still, after all these abatements, there are many things which would be either lost or useless unless they were deposited in some central receptacle, and for them a sufficient space ought to be provided in the national collection. As instances of what is meant, may be quoted the Chertsey tiles and Sir Bartle Frere's most interesting series of Hindoo sculptures, both at present in the Architectural Museum.

The management of the future museum is a detail which hardly comes within the scope of this report. It may, however, be assumed that no Board will be either efficient in itself or generally acceptable which does not include a large proportion of professional and amateur capacity named on some principle which shall give due representation to educated public opinion. Any importation of bureaucracy would be fatal to the popularity and usefulness of the institution.

As to the *locale* of the National Museum of Architecture, it cannot be too strongly urged that its position in London ought to be central, rather than suburban. Utility and popularity alike combine in favour of this recommendation; moreover, it is highly to be desired that the character of the building should be such as to correspond with and to enhance the teachings of beauty, which the collection is intended to enforce. The consignment of England's collected masterpieces of architectural art to any structure which ill-concealed poverty of design and ignorance of proportion by a superfluity of misapplied onrment, would involve a practical contradiction, alike discreditable to our national character and detrimental to our architectural progress.

SOUTH AUSTRALIAN WINES.

The following is extracted from the *South Australian Register*:—

It has been known for some time past that large quantities of the wines produced here were being shipped to Victoria, and were taking a high position in the Melbourne market; but, except to a few persons interested in the trade, it was not known that the business had assumed such large dimensions. It had been supposed by many that our produce hitherto has not been much greater than was necessary for our own consumption; and yet it appears from an article in the *Argus* that by far the largest portion of Australian wines imported by our neighbours comes from this colony. The taste for these wines is growing, and there can be but little doubt that for some time to come there will be a market in Melbourne for as much as we can send them. The writer says:—"In New South Wales they produce so little, or else are so fond of what they have got, that but little finds its way into this market. Not so with South Australia, whose wines come here in large quantities, and are in deserved high flavour. Messrs. Ritchie and Farrington, who perhaps stand at the head of the colonial wine trade in Victoria, give an estimate of the relative demand for colonial wines, taking the lowest as 1, as follows:—South Australian:—White—Erlana, 4; Verdeilho, 5; Pedro Ximenes, 1; Malvasia, 2; Muscatella, 3; Hock, 1; Riesling, 3. Red wines—Hermitage, 6; Richebourg, 3; Constantia, 2." Our best wines are placed much higher by these experienced merchants, and are in larger demand than those of either New South Wales or Victoria, and we hope our winegrowers will do their best to maintain the good character which they have already obtained. So high is the value of colonial wines in Victoria that unscrupulous persons are actually buying up low-priced and inferior German wines, and, by a kind of doctoring which they know how to perform, are working them up into a semblance of Australian wine. This is a fact much to be regretted, because the character of our pure and nutritious wines will in all probability suffer if inferior stuff, charged with drugs and fortified with strong spirit, is put into the market and sold as colonial wine.

According to the *Argus*, South Australian wines realise in Melbourne from 20s. to 25s. a dozen, in addition to the duty of 3s. a gallon which they must pay. This is a fair price, and one which ought to be highly remunerative to the producer. Of course it is the better class of wines which obtain this price. Others, we are told, are often invoiced in the wood at 2s. 6d. a gallon without the duty. We question this latter statement. A very small portion, we should think, at this price ever leaves the colony of South Australia. It must be wine which, from its inferior quality, is utterly unsaleable here, and which the people in this land would hardly accept as a gift. The humblest harvest wines would bring a better price than this. There can be no doubt that much wretched stuff has been made in South Australia. In the case of many persons the manufacture has been tentative and experimental, and much good fruit has been converted into bad wine; this is the price which has been paid in acquiring the art of winemaking. It is possible that the results of some of these experiments may have found their way to Melbourne

at 2s. 6d. a gallon; but we think we may very confidently assert that no samples which would be drunk here would be exported at such a price.

The most mischievous restriction to the sale of South Australian wine in the Melbourne market is that which arises from the Customs duty of 3s. a gallon. We hope the Conference may have agreed upon some scheme which will admit colonial productions to all the colonies free of duty. From the high character which our wines have taken, and which, from the enlarged experience of our vignerons, we have no doubt they will be able to maintain, there is no reason why we should not command the Melbourne market for many years to come. We have been assured on good authority that certain qualities of South Australian wines would, if supplied regularly and in sufficient quantities, very fairly compete with those of European production. It is something, in drinking wine, to know that it is what it professes to be—the pure juice of the grape; and we believe that, with respect to the great bulk of the wine produced in this colony, this confidence is warranted. It would be a great pity if, for the sake of assimilating them either in strength or taste to the wines of Europe, our winemakers were to resort to fortifying or doctoring their productions. They have a character of their own by which their value will be tested and determined. It would be as absurd for the manufacturers of French claret by a kind of doctoring to work that delicious wine into a bad imitation of old Port as for our vignerons to destroy the distinctive character of South Australian wines, to adapt them to the taste of those who have been accustomed to the heavy-bodied productions of Spain and Portugal. That the lighter wines will commend themselves to the taste of the great majority of Englishmen we have but little doubt. Indeed, the heavy brandied wines of the south-west of Europe have become popular in England only in late years. Every person acquainted with the social life and habits of the wine-drinking people of Great Britain before the commencement of the present century must know that the wines of France were chiefly used. When Mr. Gladstone introduced his budget to the English House of Commons—the chief point in which was the reduction of the duties on French wines—he gave several interesting and conclusive illustrations of this fact; and he maintained that the taste for full-bodied wines was a modern and an acquired taste. And the success which has attended the introduction of French wines to the English market proves that the sagacious Chancellor was right. Now we have every reason to believe that in South Australia we can produce wines in all respects equal, and in some respects superior, to those of France. Let our first-class vignerons have faith in the wines they make pure and simple, and carefully eschew all tampering with them and doctoring them, and let them sell them at as moderate a price as they can afford until the taste for them be firmly established, when they will become a necessity, and then we have no doubt they will be able to command highly remunerative prices. It is as certain as anything can be that the manufacture of wine will become one of the chief articles of South Australian produce. Taking the colony throughout, there is no description of grapes which cannot be grown, and with all the advantages we possess we cannot fail to become a large wine-producing colony.

GAS FROM CANNEL AND FROM COAL.

The following analysis of the comparative value of gas made from coals and cannel is by Dr. Andrew Fife, Professor of Chemistry, King's College, Aberdeen:—

A ton of English caking coal yields, on an average, at gas-works, 8,000 feet of gas; and though a larger quantity was given with my apparatus, yet we must take 8,000 as the quantity on a large scale. The value of the coal is taken as 1.

The Wigan cannel yielded 9,500 and 11,500; the value of the gas, bulk for bulk, being the same, viz., 1·85 to the former as 1. Now, taking into account the quantity of gas afforded, the value of the coals for yielding light, by the consumption of their gases, is as 2·23 for the one quantity, and ·25 for the other. Taking the average, we state the value of English cannel coal as 2·35, or say 2½ to Newcastle coal as 1.

The following analysis of the cannel raised by the Ince Hall Coal and Cannel Company, is by Mr. John Leigh, M.R.C.I., Consulting Chemist to the Manchester Corporation Gas Works:—

Carbonic oxide and aqueous vapour ...	1·53	
Olefiant gas and divers hydro-carbons ...	8·50	
Atmospheric air	4·32	
Nitrogen	0·19	
Hydrogen	40·30	
Light carburetted hydrogen	33·83	
Carbonic acid	11·35	
		100·02

Quantity of gas produced ... ... 11·673 cubic feet.
Specific gravity of gas ... ... 5·20 „
Coke produced from 1 ton of cannel, 13 cwt. 0 qrs. 13 lbs.

This cannel is used by the chief gas-works of this country, including London, Liverpool, Manchester, and Birmingham; and by the principal foreign gas-works, both on the Continent and in North and South America.

The analysis of the same Company's gas coal, made by Mr. J. E. Clift, Engineer to the Pagoda Gas-works, Birmingham, gives:—

Carbon, from 100 parts	84·50	
Hydrogen, „	5·14	
Oxygen, „	2·10	
Nitrogen, „	2·20	
Sulphur, „	0·33	
Ash, „	4·12	
		98·39
Loss		1·61
		100·00

Products obtained from one ton of gas coal, being the average results obtained from using 300 tons in making gas:—

Gas produced, 10,200 cubic feet; illuminating power—one Argand burner consuming five feet per hour—thirteen spermaceti candles of six to the pound; specific gravity, 462; atmospheric air being 1·00. Coke produced, 13 cwt. 3 qrs., or 44 imperial bushels; suitable for iron-founders, brassfounders, and maltsters. Ammoniacal liquor produced, 20 gallons; 1 gallon requiring 10 oz. of the sulphuric acid of commerce to saturate it. Tar produced, 10 gallons.

Purification of the gas:—1,000 cubic feet of gas requires 12½ lbs. of lime for its purification, which shows it to be comparatively very free from sulphur.

The other impurities of coal gas are not more abundant than in that made from other coals.

A further analysis of the same Company's gas coal, made by Professor Thompson, of London, gives:—

Specific gravity	1·270
Coke, per cent.	65·2
Volatile matter, per cent.	34·8
Cubic feet of gas, per ton, gross ...	11,400
„ „ „ purified	11,200
Impurity per cent. in gas	1·8
Specific gravity of purified gas	406·
Illuminating matter condensible by bromine, per cent.	4·25
Carbonic oxide in purified gas, per cent. ...	4·

Illuminating power of the gas, burnt at 5 feet per hour, equal to 13·8 spermaceti candles, each consuming 120 grains per hour.

Heating power of the coal:—1 lb. will convert 15½ lbs. of boiling water into steam.

CONSUMPTION OF WINE.

The following Table shows the proportionate consumption per cent. of each description of wine during the years 1860, 1861, 1862 :—

WINE. In Imperial Gallons.	Home Consumption.		
	1860.	1861.	1862.
From the Cape and other British Possessions	427,698	340,082	182,282
,, Holland	222,725	345,647	316,440
,, France	1,125,599	2,227,662	1,900,344
,, Portugal	1,776,138	2,702,649	2,349,954
,, Madeira	28,942	28,749	28,550
,, Spain	2,975,769	4,032,274	3,956,213
,, Canaries	4,070	3,757	3,356
,, Naples and Sicily	205,084	227,513	214,125
,, Other Countries	315,158	448,723	466,742
Various Countries, including Wines mixed in Bond	277,009	430,115	385,040

WINE. In Imperial Gallons.	Proportionate Consumption per Cent.		
	1860.	1861.	1862.
From the Cape and other British Possessions	5·81	3·15	1·86
,, Holland	3·02	3·20	3·22
,, France	15·29	20·65	19·38
,, Portugal	24·13	25·05	23·97
,, Madeira	0·39	0·27	0·29
,, Spain	40·44	37·38	40·35
,, Canaries	0·05	0·03	0·03
,, Naples and Sicily	2·78	2·10	2·18
,, Other Countries	4·28	4·15	4·76
Various Countries, including Wines mixed in Bond	3·76	3·99	3·92

OILING WOOL BY MACHINERY.

In order to render wool more workable than it is in its native state, it is customary to oil it, a process which has the effect of causing the fibres to slip more readily and evenly, and ensure more perfect cording and regular yarn. Hitherto the oil has been distributed by hand from a syringe, watering-can, or similar instrument; and the result has been that the oil has been diffused very irregularly, in some places the wool being saturated and clotted, and in others escaping altogether. This inequality in the oiling of the wool produces similar inequalities in the yarn, and the defects of the process are discernible in the various stages of manufacture. Mr. Leach, of the firm of Messrs. Littles, Leach, and Co., Britannia Mills, Leeds, has put forward a plan for obviating this difficulty. The invention has the advantage of being readily attached to willies, teazers, pluckers, burring, and other machines employed in the manufacture of wool, and is so constructed that it can distribute oil to any given extent, the machine measuring and distributing the liquid with considerable accuracy. As the wool passes along the feed-sheet of the preparing machine, the oil is, by means of the apparatus, scattered over it in the form of a spray or mist, so that the wool is thoroughly oiled, a fact which could be detected by feeling the wool; but the oil, having been so evenly and accurately distributed, was not perceptible to the eye. The quantity of oil can be varied at pleasure, and, by a simple arrangement, it can be conveyed to the machine in pipes from the cask or cistern, thus saving much labour and preventing waste.

MARYLEBONE AND WEST LONDON SCHOOL OF ART.

On Tuesday evening, the 14th July, the first annual distribution of medals and prizes amongst the students of this young yet highly successful institution took place at the Court House, Marylebone-lane. The meeting was presided over by Mr. A. J. B. Beresford Hope, who was supported by the Lord Bishop of Chichester, Mr. Harvey Lewis, M.P., the Rev. C. J. P. Eyre (rector of St. Marylebone), Mr. Peter Graham, Mr. Hepworth Dixon, Mr. Godwin, Mr. J. A. Nicholay, Dr. Marshall, Mr. S. M. Hubert, Mr. G. Phillips, Mr. W. C. Cocks, Mr. Lomax, Mr. Little, Mr. Burchett (head master, South Kensington), Mr. Collinson and Mr. Hagreen (masters of painting and architectural schools, South Kensington), Mr. Mackonald Clarke (master of the school), and others.

In opening the proceedings, the Chairman said it afforded him peculiar gratification to be enabled to preside at this inauguration, the first public assembly of the school of art, which had been so successfully founded by the untiring exertions of a few private citizens, of whom they might well be proud. He need not dwell upon the desirability of art; it was the breath, the life of the world. There were form, colour, and material in everything; and as they constituted art, so art was a necessary pre-existing accompaniment of civilisation. Two years ago this school was begun in a very humble way; and, under its indefatigable master, Mr. Clarke, it had gone on increasing till it had out-grown the infant school in which it used to assemble; and those who were then there would well remember how they worked against time and tide and circumstances, through pure enthusiasm for their vocation. Institutions of this kind required both a poetic, enthusiastic mind, and an active practical mind, to give them life and that tangible support wanted when the flame of enthusiasm had burned itself out, which it sometimes did for want of fuel. When the institution commenced, it received the support of Mr. Hubert, Mr. Jackson, of Rathbone-place, Mr. Phillips, Mr. Morant, and Mr. Peter Graham, to the last of whom the school should be especially grateful for the kind assistance he had afforded it, and who, when their tenure of the premises in Wells-street had expired, with a public, munificent spirit, put himself in the way of becoming lessee of the admirable premises in Portland-place, where the school was now situate, and interposed himself between it and the rent-collector, tax-gatherer, and others, that hovered around such institutions; and thus he enabled its promoters to carry out their good designs in the cause of art. Now the school had these excellent premises well fitted, well lighted, well conducted. As far as the teaching expenses went the school was self-supporting, but there were rent and taxes, for which the public should hold them harmless; and it was also desirable there should be something further in the shape of extra prizes, extra specimens, extra treats for the pupils, which might be contributed to openheartedly and with open hand, and of which he hoped the school would not be deprived, and to which he believed it had a just claim. In May, 1862, when the school was but a baby in swaddling-clothes, toddling alone in Wells-street, the number of pupils was 59, which increased in June to 65, and in July to 72. There were 112 in October, 134 in November, and 126 in December. In January, 1863, the school numbered 118, and got up to 125 in February. In March the number came down to 100, and in April to 90; and the first complete month it was in its new place, the pupils shot up from 90 to 140, the monthly average for the first year being about 100. In the examinations of the department of science and art, they had been very successful. There were ninety odd schools in England, to whom eighty medals were given to be competed for. The natural average distribution would therefore, be eight-ninths of a medal to each school. Instead of this school gaining the average, it had gained two medals out of eighty,—more than twice the average. If they were wise, this would make them determined to

do more this year; if foolish, make them fall back in false security on their present success. They could hardly overrate the desirability of an art-education to the handicraftsmen of this country, who should be ministers of art to the rest of the community. He did not mean to say they should have an education which puffed them up, and led them to think a few years in an art-school was to set them up above great master painters and sculptors of past ages. If so, he would retract all he had said in favour of art-schools. But he did not believe such would be the case. Handicraftsmen should be taught to be working artists—art workmen—intelligent producers of the ideas set before them. By an analysis of the school in December last, it was found that out of 223 pupils, there were 23 carvers, 23 teachers, 16 upholsterers, 16 carpenters and joiners, 15 jewellers, 14 decorators, 14 clerks, 15 cabinet-makers, 12 glass-painters, 12 chasers and die-sinkers, 11 engineers, 10 metal workers, 13 miscellaneous, 13 at school. He looked upon this great art-movement as a very important social movement as concerned the body politic, as it tended to unite classes together.

The Chairman then read the names of the "passed" students at the second-grade examination, and also the names of those who obtained prizes at that examination. The prizes were handed the winners by the chairman, who congratulated them on the honour which their success conferred alike on themselves and the institution.

Mr. Sparrow then rose, and, on the part of himself and fellow-students, presented Mr. Clarke with a handsome clock, in a marble case, with bronze statuette, as a mark of the esteem with which they regarded him, and as an acknowledgment of his efforts to promote the cause of art, to which Mr. Clarke responded.

The Lord Bishop of Chichester then addressed the meeting, and he hoped, as this was only an early stage of the school, that it would become better known each year of its existence by such an agreeable meeting as this. Nothing had been more gratifying to his feelings than to see the unselfish, generous sympathy and interest manifested by the students in the success of individuals. He had not been aware of the existence of the school, until he was lately informed of it; but he should try to do what he could in his humble way to forward its progress; as he believed that, next to the great influences of religion and morality, nothing tended more to elevate the human character than the study of the beautiful harmonies of art.

Mr. Harvey Lewis, M.P., said he felt some difficulty in speaking on the subject of art, after their patron, who had devoted so much energy, time, and money to foster the idea of art, and advance its study, as one of the most humanising and intellectual pursuits to which man could devote himself. He considered that the fact of the scholars having obtained two national medallions for eight months' work was most encouraging, and would induce the pupils to put forth all their energies to do still better in the future. Those who had visited the two Great Exhibitions of science and art which had taken place in this country, must have been struck with the vast improvement that had taken place since 1851, even in the minutest articles of domestic use; showing that articles could be produced which would delight the taste and refine the mind. Such things were not only a daily pleasure, but they also had to do with commercial prosperity. Vast numbers of foreigners were in the habit of flocking to Paris to make purchases, because they believed they would find taste there better than elsewhere. But if they took the trouble to look for it, they could find better taste in London combined with greater excellence of workmanship. If, by strict attention to the rules of art, by losing no opportunities of applying the rules of art in the various branches of industrial occupation, they could convince the world that high art could be found here as much as in Paris, then would they confer not only a benefit on themselves but also one on their country at large. Not long ago, an action had been tried at Paris, where some calico goods had been printed from a French design, and damages recovered. This showed that we ought not to copy but to originate design ourselves, instead of passively adopting the ideas of others. He would earnestly impress upon the students present to turn their natural abilities to their best use, and lay a good foundation by a proper course of instruction.

Mr. Godwin, F.R.S. said he was well satisfied with the aspect and prospects of the schools; but when he looked around the room, knowing as he did what the borough of Marylebone was, he felt the present meeting to be a positive disgrace to it, when he saw there so few of those in the borough who ought to have given their personal attendance. All should have the power of depicting what they saw. He that could learn to write could learn to draw. Thus would power be gained—art-power, and money-power too. A workman who could draw would become a foreman, and might soon become a master. During the last ten years industrial art had made great strides in England, as was shown by the accounts the French reporters had given; whilst in France they had remained stationary; and they now talked of establishing there a department of art similar to that at South Kensington. Nevertheless thousands and thousands of pounds were sent out of England every year for the purchase of patterns. A considerable portion of the designs carried out by our manufacturers were French in spirit; but if our Government had been true to art, we should now have the world coming to us for designs. This might yet be. He begged leave to propose a vote of thanks to Mr. Beresford Hope, whose activity in the cause of art was quite remarkable.

The Rev. C. J. P. Eyre said, he approved highly of the object of the school, as tending to advance men morally, socially, and politically; and felt sure no step could be taken better calculated to do so. He should be happy to give any assistance he could to the school, and was certain his parishioners would liberally respond to its wants. He was glad to hear they were looking to the public only for rent and taxes. He was glad that the institution, embracing as it did the working classes, was made dependent on their own efforts. He hoped the intelligence of the working classes of Marylebone would insure its support, with the exception of what they might be allowed to contribute in the shape of rent. He was very glad this was established; because, in addition to the rational and improving amusement provided, it had a tendency to elevate the moral feelings. He seconded the resolution, which was passed with acclamation.

Mr. Hope, in acknowledging the compliment, said when the great standard of English industrial art was raised, it was done by his father, the late Thomas Hope, when he resided in the parish. In the parish, too, he (the chairman) was born; and therefore he felt as if, in some measure, he sat there by hereditary right.

Mr. Peter Graham then proposed a vote of thanks for the Vestry Hall, which Mr. Cole seconded, and which was carried unanimously. Mr. Graham was himself most warmly received.

Mr. Hubert expressed the very great obligations the committee of the school lay under to Mr Graham for coming forward to assist them at a time when they otherwise must have appealed to the public for a contribution to erect the building; and proposed a vote of thanks should be given to him.

Mr. Hepworth Dixon seconded this, and stated that it was not until Mr. Hope told him that he was aware of the existence of this institution. He had no doubt that when it was known, men of art, men of science, and the public would come forward to render any assistance that might be asked at their hands, and enable them to go on prospering. If he might be allowed a few words to the students, he would say—there are two conditions on which you will do the great work you have commenced, and on which you will get the assistance I half dare to promise you in the name of my fellow-parishioners. First, by

being determined to work; that is the first great element of success in this world. There is a sort of ideal theory that men of genius need not work. Throw that fallacy aside the very first moment you take pen or pencil in hand. The men of genius are those that do the most work. He then instanced Bacon, Shakspere, Michael-Angelo, in support of this truth. The other condition he urged was, that the work should be done in the humble, teachable spirit in which good men and true worked.

Mr. Graham briefly responded to the compliment, and the meeting then separated.

EXAMINATION PAPERS, 1863.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(Continued from page 620.)

AGRICULTURE.

THREE HOURS ALLOWED.

1. What is the arable farmer likely to be engaged in during the month of October in the Southern counties.
2. What advantages may be expected from steam cultivation as compared with cultivation by horse labour.
3. Describe the home manufacture of "Superphosphate."
4. What, and how much per acre, are the dressings of the different manures usually given to ordinary arable crops under liberal management.
5. To what may the fertilising effects of irrigation be attributed.
6. What explanations have been given of the so-called clover sickness.
7. What crops and what extent of each would you grow on 600 acres of stiff clay land; and in what order would they follow each other.
8. Describe the cultivation of (*a*) Barley and of (*b*) *Trifolium incarnatum*—naming the soil preferred by each, its proper place in the rotation, the previous cultivation needed, and probable produce under favourable circumstances.
9. What is the annual food of a well-kept farm horse, month by month?—estimate its cost.
10. What extent of the several kinds of cropping must be grown upon a light land farm, and what quantity, and kinds, and cost of other food must be provided, for a flock of 100 Hampshire down ewes bought in August, kept throughout the year for early lamb, and fattened with their produce, to be all sold within 12 months.
11. What is the probable winter's food of a bullock coming three years old, and then fattening to 8 cwt. during the last four months of the process; estimate its cost per week.
12. What period do the mare, the cow, the ewe, the sow, respectively go with young.

MINING AND METALLURGY.

THREE HOURS ALLOWED.

Six Questions to be answered.

1. Describe the Castillian Furnace employed for the treatment of lead ores of low produce.
2. Which are the principal ores of zinc, and on what principle is their metallurgic treatment conducted?
3. In what way is coke manufactured from small coal?
4. How is an assay of galena for lead and silver most advantageously performed?
5. What do you understand by the terms, "Stope," "Winze," and "Level," as applied to metallic mining?
6. Give the process of smelting iron ores by the hot blast.
7. Describe in outline the process employed in this country for the conversion of cast iron into malleable iron.
8. For what purpose is antimony chiefly used, and how is this metal obtained from its ores?
9. Describe the Davy Lamp.
10. What is the difference between working coal by "long wall" and "pillar and stall?"
11. Give the method of determining the duty of an ordinary Cornish pumping engine.
12. What will be the mean produce of three piles of copper ore:—The first being 40 tons, assaying 8 per cent.; the second, 60 tons, assaying $7\frac{3}{4}$ per cent.; and the third, $31\frac{1}{2}$ tons, assaying $6\frac{5}{8}$ per cent.?

POLITICAL AND SOCIAL ECONOMY.

THREE HOURS ALLOWED.

It is desirable that the first series of questions be answered. The second series are optional.)

I.

1. State Professor Jones's threefold division of labourers, the different funds from which each division is paid, and the different proportions in which they exist in different parts of the world.
2. What is the effect of absenteeism upon wages?
3. What were the economical effects of emancipation on the British colonies—more especially on British Guiana?
4. Give a sketch of the history of the Excise, and explain the principles upon which it rests. State its most important branches, and their present productiveness? With what taxes is it now classed, and under what head of revenue?

II.

1. Explain the origin of tenant-right in Ireland, and the questions involved in the present assertion of that right.
2. State the principles which regulate the course of exchange between two countries, and illustrate them by the present state of the exchanges with America.
3. Give the substance of Mr. Mill's account of peasant proprietors.

DOMESTIC ECONOMY.

THREE HOURS ALLOWED.

1. Explain what you understand by domestic economy, and enumerate under different heads what you think it embraces.
2. What considerations should influence one in choosing a residence, and what are the evils which arise from sitting and sleeping in ill-ventilated apartments?
3. How would you regulate the diet and clothing of a family, having reference to their occupation in life, health, and economy?
4. Enumerate some of the simplest household arrangements most important for the preservation of health.
5. What are the comparative prices of tea, coffee, and cocoa, and which is the most nutritious and economical as an article of daily consumption?
6. Give directions for making cheap and nutritious soups.
7. What qualifications should characterise a good servant as cook or housemaid, and what qualifications in a mistress would best tend to develop them?
8. Give directions for the management of a dairy, a poultry-yard, and a laundry.
9. What are the leading principles of good management in the mother of a family in the labouring classes?
10. Enumerate the advantages of a garden to a labouring man with a family, and the useful things which may be taught to his children by the skilful cultivation of it.

11. What are the properties of the potatoe which give it the advantage over other vegetables, and what garden vegetables do you consider most nutritious?

12. Explain what you consider to be the best way of laying up small weekly savings to the greatest advantage, so as to be useful when wanted, and state your reasons.

13. How is the health, happiness, and morality of the working man and his family affected by the circumstance of his having a commodious and fitting cottage to live in?

14. What do you consider the most fitting education for the children of the labouring classes up to 12 or 13 years of age? and how are their prospects in life affected by it?

GEOGRAPHY.

THREE HOURS ALLOWED.

1. Draw from memory a rough map of some part of the British islands—either a county, a river-basin, or any tract inclusive of one of the great seats of manufacturing industry. Mark on it the places of the principal towns.

2. Give the names of the principal towns that are within the cotton-manufacturing district of England, and specify with precision the situation of each.

3. Name any six of the English counties that are chiefly distinguished as agricultural counties; also any six that are principally manufacturing. Mention one or more towns in each.

4. Enumerate the principal coal-fields of Great Britain and Ireland, with some of the towns that fall within their limits?

5. Name the rivers of Scotland, in order of geographical succession round the coast; also six of the principal lakes.

6. Name the river on which each of the following is situated:—Leeds, York, Shrewsbury, Ely, Hereford, Winchester, Glasgow, Perth, Carlisle, Maidstone, Cork, and Waterford. Also the county to which each belongs.

7. Give the names of the Australian colonies, with their capitals; state also, in reference to each, the distinguishing conditions of its produce and industry.

8. Name the British colonies in North America, with the capital of each. State in what their exports chiefly consist.

9. Draw a rough map of France, showing the river-basins, mountain-ranges, and chief towns.

10. Write a short account of the geography of the modern kingdom of Greece.

11. Describe any one of the under-named rivers, stating (in round numbers) its length in miles, general character of basin, names of principal affluents, and nature of outlet.

(*a*) The Volga.
(*b*) The Mississippi.
(*c*) The Ganges.

12. Say briefly what you know concerning the trade-winds and the monsoons, distinguishing particularly the regions in which they prevail.

13. Account for the fact that the direction of Isothermal Lines often deviates widely from that of parallels of latitude. In which of the zones is the deviation greatest?

14. Give some instances of the altered distribution of vegetable and animal life due to the agency of man, in reference particularly to the plants and animals originally confined to either hemisphere, and now distributed over both the old and the new worlds.

15. State some of the distinguishing conditions (as to outward appearance, habits, &c.) of the following families of mankind:—The Negro, the Hottentot, the Malay, the native Australian, and the New Zealander.

(To be continued.)

Proceedings of Institutions.

Darlington Mechanics' Institution.—The last report of the year 1862 says that during the past year it has been the endeavour of the committee to maintain and increase the efficiency of the institution in its various departments, so far as the interest shown by the members has supported them, and the funds at their disposal would permit. 47 new books have been added to the library and the committee have ordered the replacement of 56 worn out-volumes, which will be done forthwith. Others have been kindly presented. The library now contains upwards of 3,000 volumes, and the issues for the year have been 8,276. The reading-room continues to be well supplied with newspapers and periodicals. The lectures delivered on behalf of the institution have been as follows, viz:—Egypt to Sinai, by Arthur Pease, Esq.; William Cobbett, by George Dawson, Esq.; Electricity, by Professor Wheeler; Instinct and Reason in Animals, by Professor Wheeler; Life and Poetry of Cowper, by Dr. Pollock; Modern Music, by Mr. P. Morris; How to get on in the World, by Mr. J. De Fraine; My Scrap Book, by Mr. J. De Fraine; American War and Slavery, by Rev. M. Miller. During the latter part of the winter, readings of an instructive and entertaining character have been given on the Saturday evenings, and the committee return their thanks to the gentlemen who assisted in this effort. The committee made arrangements for the holding of both elementary and French classes, which they regret to state were not carried out, on account of the little disposition shown on the part of the members to avail themselves of these opportunities for self-improvement. The number of members shows a slight decrease as compared with last year. The present number is 373, of which three are life members, 56 news-room, 106 yearly; 208 half-yearly and quarterly. The number entered on the books has been 482. The necessity of enlarging the reading-room, and other improvements in the premises, has been from time to time before the committee, but unexpected difficulties in the completion of the purchase of the adjoining land prevented any progress in building being make; these difficulties are now removed, and the committee would recommend to their successors that the alterations should be immediately proceeded with, and would ask the friends once more to aid them in increasing their present building fund. The statement of receipts and expenditure, and the abstract of the accounts of the penny savings bank, notwithstanding the opening of the post office savings bank, again show an increase in the balance in the hands of the treasurer, and in the number of working accounts; so favourable a result must to no small extent be attributed to the assiduous and able exertion of the managers. The statement of accounts of the institution shows that the receipts have been £186 10s. 2d., and that there is a balance in the treasurer's hands, on general account of £34 19s. 4d., and on account of the building fund of £121 13s. The penny savings bank deposit account is as follows:—

	£ s. d.	£ s. d.	£ s. d.
By amount due to depositors at 22nd February, 1862 ...		733 19 3	
,, amount received during the year	597 12 9		
,, less amount paid ...	569 12 9		
		28 0 0	
			761 19 3
INTEREST ACCOUNT.			
,, Amount received from J. Backhouse and Co.			22 16 0
			784 25 4

The total number of transactions during the year has been 7,176, viz., 6,494 sums received, and 682 sums paid; or an average of 138 weekly. The number of new accounts opened during the year has been 343, making a

total of 2,820 accounts opened in six years since the commencement of the bank. The number of accounts having balances at 28th February last was 905 (being an increase of 54 since the previous yearly balance), and the average amount to the credit of each depositor 16s. 10d.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 18th and 20th July, 1863.

246. Bills– Thames Embankment (South Side) (Lords Amendments).
247. ,, Prison Ministers (Lords Amendments).
248. ,, Sheep and Cattle (Scotland) (Lords Amendments)
249. ,, District Parochial Churches (Ireland) (Lords Amendments).
250. ,, Colonial Acts Confirmation.
Statistical Abstract for the United Kingdom (1848 to 1862).

Delivered on 21st July, 1863.

391. Factories—Copy of Memorials, &c. (a corrected Copy).
427. Malta and Alexandria Telegraph—Return.
428. House Duty—Return.
444. Oxford University—Paper.
459. Galway, Boston, and New York Mails—Contract (a corrected Copy).
Poland—Correspondence (Part 4).
Abeokuta—Letter from the Reverend H. Venn.

Delivered on 22nd July, 1863.

446. Redundant List (Public Departments)—Return.
448. Kitchen and Refreshment Rooms (House of Commons)—Fourth Report from Committee.
456. China—Return.
462. Army Prize Money—Account.
460. Malt Duty—Report from Committee.
354. Poor Relief (Ireland)—Return.
251. Bills—Clergymen (Colonies).
252. ,, Alterations in Judges' Circuits.
253. ,, Superannuations (Union Officers).
254. ,, Removal of Irish Poor (Lords Amendments)
255. ,, Marriages Registration (Ireland) (Lords Amendments).

Delivered on 23rd July, 1863.

348. Steam Vessels—Return.
458. Chamber of London—Annual Accounts.
465. Armstrong Guns—Return.
475. Civil Services—General Abstract of the Grants.
256. Bills—Rum Duty.
257. ,, Savings Banks Acts Amendment (Lords Amendments).
258. ,, Port Erin Harbour (Isle of Man) (Lords Amendments).
259. ,, Drainage and Improvement of Land (Ireland) Lords Amendments.

Delivered on 24th July, 1863.

443. Revenue (Ireland)—Accounts.
450. Joint Stock Companies—Return.
455. British Museum—Return.
464. Shipping of Crews (Liverpool)—Return.
471. Superior Courts of Law (Fee Fund)—Paper.
481. Supply and Ways and Means (Session 1863)—Return.
261. Bills—Exhibition Medals.
260. ,, Church Building and New Parishes Acts Amendment (as amended by the Select Committee).
262. ,, Vaccination (Scotland) (Lords Amendments).
263. ,, Stipendiary Magistrates (Lords Amendments).
264. ,, Misappropriation by Servants (Lords Amendments).
265. ,, Pier and Harbour Orders Confirmation (Lords Amendments).
266. Alkali Works Regulation (Lords Reasons).
West India Mails—Contract.
Census of Ireland for the year 1861, Vol. I. (Area, Population, &c.)—Part I. (County and City of Dublin, County of Kildare, King's County, County of Longford, County of Louth and Borough of Drogheda, and County of Meath).

Delivered on 25th July, 1863.

447. Coinage—Accounts.
461. Vessel *Gibraltar*—Return.
472. Metropolitan Police (Guildhall Entertainment)—Return.
267. Bills—Fisheries (Ireland) (Lords Amendments).
268. ,, Nuisances Removal Act (1855) Amendment (Lords Amendments).
269. ,, Turnpike Trusts Arrangements (Lords Amendments).
270. ,, Pauper Lunatic Asylum (Lords Amendments).
271. ,, Waterworks Clauses (Lords Amendments).
272. ,, Trustees (Scotland) Act Amendment (Lords Amendments).
273. ,, Petty Sessions (Ireland) (Lords Amendments).
274. ,, Navy Prize Agents (Lords Amendments).
Royal Academy—Report of Commissioners.
New Zealand (Recent Disturbances)—Further Papers.
Census of Ireland for the Year 1861—Vol. II. (Ages and Education) Part II.
Public General Acts—Caps. 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, and 54.

Delivered on 27th July, 1863.

474. Bankruptcy and Insolvency—Return.
477. Poor Law—Return.
372. East India (Coal Fields)—Report of Dr. M'Clelland.
275. Bills—Charitable Uses (Lords Amendments).
276. ,, Companies Clauses (Lords Amendments).
277. ,, Railways Clauses (Lords Amendments).
278. ,, Telegraphs (Lords Amendments to Commons Amendments).
Poland—Further Correspondence (Part V.)
Census of Ireland for the year 1861, Vol I. (Area, Population, &c.)—Part I. (County of Carlow, County and City of Kilkenny, Queen's County, County of Westmeath, County o Wexford, and County of Wicklow, &c.)

Delivered on 28th July, 1863.

426. Copper, &c.—Return.
484. Ionian Islands (Pensions, &c.)—Return.
485. Ionian Islands (Payment of Contribution)—Return.
297. Pitcairn Islanders (Norfolk Island)—Return.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 31st*, 1863.]

Dated 19th March, 1863.

737. H. O. Haughton, Liverpool—Imp. in machinery for drying and cooling grain and seeds. (A com.)

Dated 21st April, 1863.

992. H. Yeadon, E. Yeadon, and S. Yeadon, Stockport, and J. Yeadon, Leeds—Improved healds for weaving.

Dated 11th June, 1863.

1455. C. L. V. Tenac, Tredegar, Monmouthshire, South Wales—A new or improved daily balance book, with moveable or sliding tickets or slips. (A com.)

Dated 22nd June, 1863.

1561. J. Sainty, Burnham Market, Norfolk—An improved turnip cutter for cutting the last slice.
1563. A. Twaddell, Glasgow—Imp. in sizeing or preparing warps.
1567. L. A. Majolier, Stoke Newington—Imp. in apparatus for carburetting gases. (A com.)
1569. W. Clark, 53, Chancery-lane—Imp. in apparatus for charging air or gases with combustible vapours. (A com.)
1571. W. L. Winans, Dover-street, and T. Winans, Baltimore, U.S.—Imp. in adapting propellers for propelling ocean steam vessels.
1573. W. E. Newton, 66, Chancery-lane—Imp. in printing machinery. (A com.)

Dated 23rd June, 1863.

1575. J. Murray, Glasgow—Imp. in machinery for making chains or chain cables and rings.
1577. J. Ellison and A. Rogerson, Bury—Imp. in slubbing, intermediate and roving frames, in throstles and winding machines used for the manufacture of cotton or other fibrous materials.
1579. S. Robinson, J. Priestley, and J. Foulds, Bradford—Imp. in looms for weaving.
1581. R. A. Brooman, 166, Fleet-street—Imp. in breech-loading arms. (A com.)
1583. W. L. Winans and T. Winans, Dover-street—Imp. in lessening the friction of the rubbing surfaces of the slide valves of engines and of the journals of shafts.
1585. E. Brooks, Birmingham—Imp. in breech-loading fire arms.
1587. F. Feichtinger, 26, Cumberland-street South, Belgravia—Imp. in the manufacture of paper applicable for hemorrhoidal complaints.

Dated 24th June, 1863.

1589. S. Knowles and R. Hayward, Tottington Mill, near Bury—Imp. in machinery for plaiting and measuring woven fabrics.
1595. T. Skinner, Sheffield—Imp. in the ornamentation of silver, German silver, Britannia metal, electro-plated, or other plated goods.

Dated 25th June, 1863.

1597. A. Ripley, Brook-street, West-square, Lambeth—Imp. in the method and construction of a packing, chiefly applicable to piston-rods, pumps, and such like, and for forming the joints of gas, steam, or water pipes.
1601. J. O. Mathieu, Paris—Imp. in twisting machines, particularly applicable to the manufacture of strings, strands, ropes, or cables.
1607. J. Head and H. Brinsmead, Ipswich—Imp. in machinery applicable to thrashing machines, and for cutting and bruising straw.

Dated 26th June, 1863.

1609. W. Clark, 53, Chancery-lane—Imp. in apparatus for aerating liquids. (A com.)
1611. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus for placing tyres on wheels, or hooping or ferruling generally while the metal is hot. (A com.)

1613. R. Mushet, Coleford, Gloucestershire—Imp. in the manufacture of iron and steel.

Dated 27th June, 1863.

1617. E. T. Hughes, 123, Chancery-lane—Imp. in couplings for hose pipes, and also in connecting axles to the naves or bosses of wheels. (A com.)

Dated 29th June, 1863.

1621. C. Avery, 39, Craven-street, Strand—Imp. in rotary engines.

Dated 30th June, 1863.

1623. F. J. Duggan, Bristol—Improved methods of connecting lamp chimnies and other glasses or shades with the burners of lamps.
1627. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for moulding or shaping pottery ware. (A com.)
1629. C. H. Gardner, West Harding-street, Fetter-lane—Imp. in lithographic and zincographic presses.
1631. S. Cole, Moseley, Worcestershire—Imp. in clasps or fastenings for securing brooches, solitaires, and other dress ornaments.

Dated 1st July, 1863.

1633. J. Blake, Accrington—Imp. in apparatus for reducing and regulating the pressure or quantity of steam, and in discharging the water of condensed steam from cylinders, pipes, and other vessels.
1635. W. Snell, 16, Clement's-inn, Strand—An improved waterproof material. (A com.)
1637. Capt. C. P. Coles, R.N., Southsea—An improved method of and apparatus for working guns in vessels and forts, and discharging them under water.
1639. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in coating or covering metal sheets with metals or alloys, and in the apparatus employed therein. (A com.)
1641. T. Taylor, Wandsworth—Imp. in railway breaks.

Dated 2nd July, 1863.

1645. J. J. Shedlock, Vincent-street, Westminster—Imp. in wet gas meters.
1647. A. A. Croll, Coleman-street—Imp. in the preparation of materials to be used in the purification of gas for illumination.

Dated 3rd July, 1863.

1652. C. Martin, Brentford—Imp. in the treatment and preparation of materials for the manufacture of paper.
1655. R. Davison, London-street—Imp. in machinery for decorticating and cleansing corn and other grain. (A com.)
1657. H. Brinsmead, Ipswich—Imp. in cooking apparatus.
1659. H. S. Warner, Trinidad—An improved mode of and apparatus for treating or preparing megass and other substances to be used as fuel.

Dated 4th July, 1863.

1661. J. C. Macdonald, Waddon, near Croydon, Surrey, and J. Calverley, 26, George-street, Peckham—Imp. in the manufacture and application of printing apparatus.
1662. M. E. Eyth, 60, Boulevart de Strasbourg, Paris—An improved rotative engine.
1663. J. McDonald, Ashton-under-Lyne—Certain imp. in Jacquard looms.
1665. J. Grimson, Leicester—Imp. in shuttles for weaving narrow fabrics, and in mounting and fitting them to the battens.
1669. A. Norman, Clarendon-road, Notting-hill—An improved apparatus for fanning or for agitating air.
1671. G. A. Barrett, W. Exall, C. J. Andrewes, and A. Barrett, Reading, and J. L. Bowhay, Modbury, Devonshire—Imp. in the arrangement and construction of fixed and portable combined thrashing machines.

Dated 6th July, 1863.

1674. W. B. Adams, Holly Mount, Hampstead—Imp. in wheels, and their tyres, axles, and axle boxes.

Dated 8th July, 1863.

1696. J. Gibson, 31, Ormond Quay, S. Trulock, R. Trulock and W. Trulock, Essex Quay, Dublin—Imp. in breech-loading fire arms.
1702. W. E. Newton 66, Chancery-lane—Imp. in the construction of locks and fastenings. (A com.)

Dated 13th July, 1863.

1744. H. N. King, 42A, Milsom-street, Bath—An improved mode of and apparatus tor producing spectral illusions on the stage.
1750. R. A. Brooman, 166, Fleet-street—Imp. in sizing or gumming warp and weft threads. (A com.)

Dated 15th July, 1863.

1776. C. Clemm, Dresden, Saxony—New employment of magnesia and its combinations in manufactures.

Dated 16th July, 1863.

1780. S. A. Cooper, 5, Lower Chapman street, St. George's East—An improved packing case to contain bottled beer, wine, or any other liquid in bottle.
1786. G. Rand, Stoneham, Hants—Imp. in the means of and apparatus for boiling and cooking.

Dated 17th July, 1863.

1798. E. Alcan, King-street—An imp. in gas burners. (A com.)
1800. G. F. Wilson and G. Payne, Sherwood Works, Battersea—Imp. in the manufacture of soap.

Dated 18th July, 1863.

1806. G. Murdoch, Portsmouth—Imp. in the construction of steam and vacuum gauges.

Dated 20th July, 1863.

1808. W. Simpson and J. Hutton, Northampton—Imp. in the manufacture of hollow cutting tools.
1810. R. B. Brassey and J. Hargreaves, Ashton-under-Lyne—Imp. in machinery or apparatus for sizing and drying yarns and fabrics.
1812. J. Bailey and W. H. Bailey, Albion Works, Salford—Imp. in apparatus for the prevention of boiler explosions.
1814. W. H. Gedge, 11, Wellington-street, Strand—Imp. applicable to inland navigation. (A com.)
1816. F. Ayckbourn, Moreton-street—Imp. in air and water beds, pillows, bolsters, and cushions.
1818. R. Weare, Northwood, Stoke-upon-Trent, Staffordshire—Imp. in water-closets, commodes, slop pails, and other like apparatus or utensils.

Dated 21st July, 1863.

1824. C. S. Duncan, Inverness-road, Bayswater—Imp. in the means of and apparatus for heating, melting, boiling, evaporating, and other useful purposes.
1826. J. E. Varmer, Coleman-street—Imp. in the manufacture of umbrellas and parasols.
1828. R. A. Brooman, 166, Fleet-street—Imp. in watches and other time-keepers. (A com.)
1830. W. Naylor, Queen's-road, Dalston—Imp. in safety valves, and in apparatus connected therewith.

Dated 22nd July, 1863.

1832. P. R. Jackson, Salford—Imp. in machinery for rolling hoops and tyres.
1838. I. Perrin, Birmingham—An improved danger signal to be used on rifle, artillery, and other practising grounds.

Dated 23rd July, 1863.

1844. G. Davies, 1, Serle-street, Lincoln's-inn—An imp. in revolving fire-arms. (A com.)
1848. W. Clark, 53, Chancery-lane—Imp. in saddles. (A com.)

Invention with Complete Specification Filed.

1846. M. Meisel, 14, Park-walk, West Brompton—An improved apparatus for regulating the speed of trains on railways, and in assisting the locomotive engine and train in ascending and descending inclined planes. (A com.)—23rd July, 1863.

Patents Sealed.

[*From Gazette, July 31st*, 1863.]

July 31st.	337. R. A. Brooman.
304. J. Fletcher and H. Bower.	345. G. Turner.
305. A. T. Blakely and J. Vavasseur.	354. B. Dobson and E. Barlow.
312. T. Bradford.	366. J. F. Bottom.
318. W. T. Weston.	385. G. H. Birkbeck.
319. B. Russ.	403. W. Baylis and T. H. Hopwood.
328. R. A. Brooman.	559. W. Clark.
330. R. A. Brooman.	895. F. J. Risse.

[*From Gazette, August 4th*, 1863.]

August 4th.	375. W. Symington.
351. M. Hackforth.	376. R. A. Brooman.
352. G. Redrup.	378. H. Wycherley.
357. D. Law and J. Downie.	386. S. M. C. Innes.
358. J. Goucher.	389. J. F. Spencer.
361. J. Crosby and J. B. Smith.	390. J. Robertson.
363. R. Burley.	489. J. P. F. Datichy.
365. M. Cartwright.	520. J. Fitter.
368. A. Corneau.	643. A. V. Newton.
369. H. Donald.	691. W. West.
370. E. T. Hughes.	1117. R. G. Kent.
371. J. Duckworth.	1216. L. S. Chichester.
374. R. Saunders.	1656. J. Webster.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, August 4th*, 1863.]

July 29th.	*August 1st.*
1869. F. H. Trevithick and R. Jones.	1874. B. Arnold.
July 30th.	1880. S. S. Skipton.
1856. J. Goucher.	1895. J. Higgins and T. S. Whitworth.
July 31st.	1896. T. Webb.
1980. G. Jeffries.	1919. J. Fielding, D. Whittaker, and B. Croasdale.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, August 4th*, 1863.]

July 27th.	*July 31st.*
1793. J. Knowles.	1820. W. Wood and M. Smith.
	1988. E. A. Cowper.

Journal of the Society of Arts.

FRIDAY, AUGUST 14, 1863.

SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

NOTICE TO MEMBERS.

In accordance with the Report adopted at the General Meeting held on the 17th ult., additional subscriptions for carrying out the Society's Memorial of His Royal Highness the Prince Consort are invited.

Any member desiring to subscribe, or to increase the amount of his subscription, is requested to send a Cheque or Post-office Order, made payable to Mr. Samuel Thomas Davenport, the Financial Officer.

PROGRAMME OF EXAMINATIONS FOR 1864.

PRELIMINARY NOTICE.

I. These Examinations have been established for the benefit of members and students of the Institutions in Union with the Society of Arts. Such persons are commonly mechanics, artisans, labourers, clerks, tradesmen and farmers in a small way of business, apprentices, sons and daughters of tradesmen and farmers, assistants in shops, and others, of various occupations, who are not graduates, undergraduates, or students of a University, nor following nor intending to follow a learned profession, nor enjoying nor having enjoyed a liberal education. To all such members and students, and *persons of the like condition*, male and female, the Examinations, Certificates, and Prizes, described in this Programme, are open on the conditions stated herein.

II. Persons also of a higher grade in society may be examined and receive Certificates, but cannot compete for prizes.

III. Persons who are, or have been, professional Teachers, or Pupil Teachers, may be examined and receive Certificates, but cannot enter into the general competition for prizes.

LIST OF EXAMINERS FOR THE FINAL EXAMINATION IN 1864.

Rev. Alexander Wilson, M.A., National Society, London.

John Ball, Esq., of the firm of Messrs. Quilter and Ball.

J. J. Sylvester, Esq., M.A., F.R.S., Professor of Mathematics at the Royal Military Academy, Woolwich.

Rev. B. Morgan Cowie, M.A., Professor of Geometry at Gresham College; one of H.M. Inspectors of Schools.

John Sykes, Esq., M.A., Fellow of Pembroke College, Cambridge, Assistant-Secretary to the Committee of Privy Council on Education.

Rev. T. G. Hall, Professor of Mathematics in King's College, London.

Rev. Bartholomew Price, M.A., F.R.S., Sedleian Professor of Natural Philosophy in the University of Oxford.

Rev. Joseph Woolley, LL.D., one of Her Majesty's Inspectors of Schools.

Rev. Jonathan Bates, M.A., Fellow of Gonville and Caius College, Cambridge.

T. M. Goodeve, Esq., Professor of Mechanics at the Royal Military Academy, Woolwich.

Charles Brooke, Esq., M.A., F.R.S., Surgeon to the Westminster Hospital.

Jas. Glaisher, Esq., F.R.S., Royal Observatory, Greenwich.

A. W. Williamson, Esq., Professor of Chemistry, University College, London.

John Marshall, Esq., F.R.S., F.R.C.S., Surgeon to the University College Hospital, and Lecturer on Anatomy in the Government Department of Science and Art.

Daniel Oliver, Esq., F.R.S., F.L.S., Professor of Botany in University College, London, and Librarian of the Herbarium of the Royal Gardens, Kew.

J. C. Morton, Esq.

J. Arthur Phillips, Esq., Civil Engineer, Graduate of the Imperial School of Mines of France, &c.

Charles Neate, Esq., M.A., Professor of Political Economy in the University of Oxford.

The Very Rev. Richard Dawes, F.R.S., Dean of Hereford.

Wm. Hughes, Esq., F.R.G.S., Professor of Geography in Queen's College, London.

C. H. Pearson, Esq., M.A., Professor of Modern History, King's College, London.

Rev. Samuel Clark, M.A., F.R.G.S., *Chairman of the Board.*

J. F. Ferrier, Esq., LL.D., Professor of Moral Philosophy and Political Economy in the University of St. Andrew's.

Rev. F. Temple, D.D., Head Master of Rugby School.

Alphonse Mariette, Esq., M.A., Professor of French, King's College, London.

Dr. Bernays, Professor of German, King's College, London

F. S. Cary, Esq.

Thomas Bradley, Esq., Professor of Geometrical Drawing in King's College, London.

John Hullah, Esq.

LOCAL EDUCATIONAL BOARDS.

1. To enable any person, in any locality, in the United Kingdom, to take advantage of the Examinations, there must be in that locality a Local Educational Board in connection with the Society of Arts.

2. For a list of the Local Boards already formed, with the names and addresses of their secretaries, see page 643. Additional Local Boards may be formed wherever the managers of Institutions, or other persons desirous to promote the instruction of adults, may be prepared to cooperate with the Society of Arts.

3. Each Local Board must consist of at least three members; and, with advantage, may be much more numerous. There must be a Chairman and a Secretary. The district for which the Board is to act should be defined; and every Educational Institution within those limits should be represented in the Board. Each Local Board should include the representatives of more Institutions than one, and there should not be more than one Local Board in each locality. The composition of the Board must be such as to command the respect and confidence of the neighbourhood. Where gentlemen of high literary and scientific attainments are willing to serve on the Board, their services are of great value; but the necessary work may be done by any well educated persons of high character and good sense. No member or officer of a Local Board can be admitted to the examinations.

4. Local Educational Boards in connection with the Society of Arts make no payment to the Society, unless they desire to exercise the power of admitting candidates who are not members of any Institution in direct union with the Society of Arts (see paragraph 28 *B*. page 236); in which case a subscription of one guinea a year must be paid.

5. A detailed list of the names, addresses, and designations of the chairman, secretary, and other members, of each Local Board must be submitted to the Council of the Society of Arts before the 1st of February, 1864, when the general list of such Boards will be published.

6. Where a Local Board comprises so large a district that, for the convenience of the candidates, Branch Local Boards have to be formed, lists of these must also be given. All changes in the composition of the Boards must be immediately notified to the Society of Arts.

EXAMINATIONS.

7. The Examinations are twofold:—

The Previous Examinations, by the Local Boards, for persons of any age not under 12.

The Final Examination, by the Central Board, under the supervision of the Local Boards, for persons of any age not under 16.

Previous Examinations by the Local Boards.

8. The Previous Examinations are designed—not only to "sift" the candidates for the Final Examination, but also—to encourage and lead on those who, from the insufficiency of their ages or attainments, may be at present unqualified to undergo it.

9. In "sifting" the candidates above 16, each Local Board has to satisfy itself that those to whom it grants a "pass" to the Final Examination are adequately grounded in Elementary knowledge (in writing, spelling, English grammar and composition, and the common rules of arithmetic), and also are likely to obtain from the Central Board a certificate in the special subject or subjects in respect of which such "pass" is given. This being borne in mind by the Local Boards, the Society of Arts does not desire to prescribe minutely to them how they should satisfy themselves on these points. The best method of sifting the candidates in the Special subjects, is for the Local Boards to examine them by means of printed (or written) questions and written answers; but, where a Local Board finds itself without the means of conveniently holding such an Examination in any Special subject, even with the aid which may be afforded to such Board by the Committee of its Provincial Union, or by an "expert" willing to assist with or without remuneration, it will suffice for such Board to satisfy itself in any other mode, and to state simply that it has satisfied itself that the candidate is fit to be examined by the Central Board in that subject.

10. The sifting in Elementary subjects may be performed in various modes, according to the presumed attainments of the candidates. The Examiners in the Final Examination will certainly reject all ill-written, ill-spelt, ill-composed, or ungrammatical papers that may be laid before them. A candidate once "passed" by a Local Board in the Elementary subjects, may be again "passed" for Examination in any Special subject, without being again "sifted" in the Elementary subjects. Generally it is convenient that the "sifting" of candidates for the Final Examination be held at the same time, and combined, with those Elementary Examinations which the Local Boards are recommended to hold for persons whose insufficiency of age or attainment disqualifies them at present from undergoing the Final Examination. The Local Boards are recommended not only to hold annually such Elementary Examinations, but to grant their own Certificates, and also prizes if possible, to those who pass them with success. Each Local Board may, if it think fit, frame its own regulations, questions, and certificates; but, as it is obviously desirable that as near an approach to uniformity as possible should be obtained, a "Central Committee of Educational Unions" has been formed, which, without in any way exercising authority over the various Local Boards, offers annually for general use a scheme of Elementary Examinations.

11. The Central Committee consists of representatives of each Provincial and District Union and Adult Educational Society in union with the Society of Arts, some members of the Council of the Society of Arts, the Chairman of the Society's Central Board of Examiners, and representatives of Local Educational Boards. This Committee provides a scheme of Elementary Examinations, in two sets of papers, one suited for junior, the other for senior candidates, with corresponding Forms of Certificate, to be awarded by the local authority under which these Examinations are conducted.

12. The following is the Central Committee's scheme of Elementary Examinations for 1864:—

Junior.

1. Every candidate must be examined in the first four rules of Arithmetic, simple and compound.

Male candidates must be examined in any *two*, and females in any *one*, of the three following subjects:—

A. A General knowledge of the Gospel History.
B. The rudiments of English History.
C. The rudiments of the Geography of England.

2. Female candidates must also be examined in plain needlework.

3. Fair writing and spelling, with good reading of a simple narrative, will be required of every candidate.

4. A satisfactory examination will entitle the candidate to a certificate.

Senior.

1. Every candidate must be examined in Arithmetic, including the Rule of Three, Decimal and Vulgar Fractions.

Male candidates must be examined in any *two*, and females in any *one*, of the three following subjects:—

A. The facts of St. Luke's Gospel and the Acts of the Apostles.
B. English History from the accession of Henry VII. to the accession of James the First, with the rudiments of the history from the Conquest.
C. Geography of the British Isles.

2. Every female candidate must also show proficiency in needle work.

3. All candidates will be required to exhibit in their papers a fairly good handwriting, spelling, and knowledge of grammar.

4. A satisfactory examination will entitle the candidate to a certificate.

13. To prevent the possibility of a premature knowledge of the Examination Papers, the Examinations must be simultaneous everywhere, and in 1864 they must be held on the 1st, 2nd, 3rd, and 4th March, after 4 o'clock p.m.

14. In these Examinations there is no competition for the certificates. They are awarded for positive not comparative merit; but in any locality, if prizes are offered by the local authority, there may be with advantage a competition for such prizes.*

15. The Secretary of each Union, Society, or Board, which desires to use the Examination Papers of the Central Committee, must apply for the requisite forms on or before the 1st February, 1864, to the "Secretary of the Society of Arts."†

16. The Previous Examinations must be held by the Local Boards sufficiently early in the year 1864 to allow the results to be communicated to the Council on or before the 21st of March. The Form in which such communication is to be made will be furnished on application (see Form No. 2 in Appendix) and the required number of copies of Form No. 4 will be forwarded. These must be filled up and returned by the 28th March. If the papers issued by the "Central Committee" are used, the Examinations must be held on the days specified in paragraph 13.

FINAL EXAMINATION BY THE EXAMINERS OF THE SOCIETY OF ARTS.

17. No candidate can be admitted to the Final Examination without a certificate (see Form No. 4 in Appendix) from a Local Board.

18. These Forms having been returned to the Secretary of the Society of Arts, by the 28th March, the printed papers of questions in the various subjects will be prepared by the Society's Examiners, and will be forwarded to the Secretaries of the Local Boards.

19. The whole of the papers appointed for each of the evenings of the Examination, according to the subjoined Time-table, with the required number of Forms of Declaration (Form No. 8), will be contained in a separate sealed envelope, which is not to be opened till the Candidates are present, at half-past six on that evening.

20. The details of the mode in which the Final Examination is to be conducted, are given in the "Letter of Instructions" (see Form No. 6 in Appendix), and every member of each Local Board should make himself thoroughly acquainted with them.

21. The Final Examination must be held *simultaneously on the days and at the hours specified in the following Time-table,* at those places where Local Boards are established.

22. In choosing the subjects in which they desire to be examined, candidates must take notice of the arrangements of this Time-table, as they *cannot* be examined in *two* subjects which are set down for the same evening.

TIME-TABLE FOR 1864.

No Candidate may work more than one paper on each evening, and each paper must be worked on the particular evening appointed for it.

TUESDAY, 26TH APRIL, From 6.30 to 9.30 p.m.	WEDNESDAY, 27TH APRIL, From 6.30 to 9.30 p.m.	THURSDAY, 28TH APRIL, From 6.30 to 9.30 p.m.	FRIDAY, 29TH APRIL, From 6.30 to 9.30 p.m.
Arithmetic.	Book keeping.	Algebra.	Geometry.
Trigonometry.	Navigation and Nautical Astronomy.	Practical Mechanics.	Mensuration.
Magnetism, Electricity, and Heat.	Conic Sections.	Astronomy.	Principles of Mechanics.
Agriculture.	Chemistry.	Animal Physiology.	Botany.
Mining and Metallurgy.	Music.	Political and Social Economy.	Geography.
Geometrical Drawing.	Domestic Economy.	French.	Latin.
German.	English History.	†English Literature.	Logic and Mental Science.
			Freehand Drawing.

† Two Papers of one hour and a half each in this subject are considered as one.

23. The Local Boards must see, and certify to the Council, in the form which the Council will furnish (see Appendix, Form No. 8), that the papers are fairly worked by each candidate, without copying from any other, and without books or other assistance; and must seal up and return the worked papers to the Council *immediately* on the close of each evening's Examination. The papers will then be submitted to the judgment of the Examiners, and certificates of three grades will be awarded.

24. The names of the candidates who obtain Prizes and Certificates will be published in the *Journal of the Society of Arts*, as soon as the Examiners have pronounced their judgment, and the Prizes and Certificates will subsequently be forwarded to the Local Boards for distribution.

25. A candidate who has obtained from the Society a certificate of the 1st class in any subject, cannot again be examined in the same subject.

26. A candidate who has obtained a certificate of the 2nd or 3rd class may, on the recommendation of the Local Board, be examined in the same subject, in a subsequent year, without again passing the Previous Examination, but the name must always be returned in the proper form. (No. 4 in the Appendix.)

27. A candidate who, having obtained a certificate in any subject, desires to be examined in some other subject, in a subsequent year, may be "passed" by the Local Board, after examination in that subject, without re-examination in the elementary subjects.

* As it is inconvenient for any central body to examine a large number of written answers, and undesirable that the responsibility of the Elementary Examinations should be taken out of the hands of the local authorities, a certain amount of diversity in the mode and result of the Elementary Examinations is inevitable, but this it is proposed to reduce to a *minimum* by attaching to special copies of the examination papers printed for the use of the examiners alone, the number of marks to be awarded for a complete answer to each question. For instance, suppose that in a paper there are twelve questions, and that the aggregate number of marks assigned to the paper is 120. The number of marks placed opposite to each question in the paper would of course depend upon its relative difficulty, and the proportion of these marks given by the examiner for the answer of any candidate would depend upon its accuracy and completeness. Thus, supposing a question perfectly answered to be worth 20 marks affixed in the examiner's copy, an examiner might award 20, 15, 12, or any less number, according to the merit of the answer. It is thought that in this way the candidates all over the country, though their papers be tested by different examiners, will be placed as nearly as possible upon an equal footing. It is further suggested that no candidate should receive a certificate who does not obtain at least 30 marks in *each* paper (the whole paper being worth 120 marks) *and* an aggregate of 150 marks in the three papers in which he is examined—that is to say, that 30 marks would be the minimum for a "pass" in any one subject, but that an average of 50 marks in each paper would be required to obtain a certificate, so that a candidate obtaining only 30 marks in one paper must obtain 60 in each of the others to obtain a certificate. The subjects of reading, writing, spelling, and needlework would still remain to be decided by the general impression in the minds of the examiners at the various centres, but it is not thought desirable to attempt to fix any number of marks as a standard of proficiency in these subjects. It is important that the same persons should examine *all* the candidates in any one subject of any of the several centres.

† In any case in which a Local Examining Body may examine candidates in the doctrines of Holy Scripture, in the Prayer Book, or in any other religious formulary, the results of such Examination may be stated, by that local Examining Body, on the certificate; though the Central Committee, representing a variety of opinions, does not itself provide for Examinations in religious doctrine. The "Metropolitan Association for Promoting the Education of Adults" announces that at its request the Bishops of London and Winchester have established collateral examinations in the Bible and Prayer Book, with certificates and prizes for those certificatees of that Association who may desire to undergo examinations in such subjects.

TERMS OF ADMISSION TO THE FINAL EXAMINATION.

28. Every Candidate for Examination must be admitted through a Local Educational Board connected with the Society of Arts, and be at least 16 years of age.

(*A.*) Members of, or students of classes in, Institutions in direct Union with the Society of Arts are admitted ... ... Free.

(*B.*) Members of, or students of classes in, "Small Institutions"* not in direct Union with the Society of Arts, but connected with it through a Provincial Union or Local Board, are admitted on payment of a fee of ... 2s. 6d.

(*C.*) Persons of a higher class of society than those described in paragraph I. (Preliminary Notice), are admitted on payment of a fee of . 10s. 6d.

N.B.—The Council in every case leave it to the Local Board to decide whether a candidate should pay this fee.

29. Candidates coming under the head (*C.*), as well as Professional Teachers and Pupil Teachers, though they may be examined and receive certificates, cannot compete for the prizes of which details are given at page 642.

SUBJECTS FOR THE FINAL EXAMINATION IN 1864.

30. In the following paragraphs will be found brief outlines of the subjects in which the candidates will be examined, and their attention is especially drawn to this part of the programme, Though in most instances the Examiner has set down certain Text-books, in so doing he pronounces no opinion as to their merit. Real knowledge, however or wherever acquired, will be accepted by the Examiners.

*** N.B.—The paragraphs preceded by these asterisks are the remarks made by the Examiner in each subject on the papers worked by the Candidates in 1863.

I.—Arithmetic.

Examiner.—Rev. Alexander Wilson, M.A.

31. Practice—Simple and Compound Proportion—Interest—Discount—Insurance—Vulgar and Decimal Fractions; with the principles of a Decimal Notation in money on the basis of the pound unit.

32. The questions framed from the preceding syllabus will consist mainly of practical problems, and the Examiner will take into account not only the correctness of the answers, but also the excellence of the methods by which they are worked out, and the clearness and neatness of working, *which must always be shown.*

33. Text Books:—Any of the modern treatises on Arithmetic, such as Hunter's Text Book (*National Society*), Colenso (*Longmans*), or Barnard Smith (*Macmillan*).

*** "The marked improvement which I mentioned in connection with the papers of last year is fully sustained by those which have been sent in for the present Examination. The mechanical portion of the work has, in general, been very neatly and clearly done; while the solutions of the various questions show a highly commendable amount of skill and intelligence."

* Small Institutions are defined as those which have an income of less than £75 a year.

II.—Book-keeping by Double Entry.

Examiner.—John Ball, Esq.

34. Candidates should be prepared to answer questions as to the nature and use of the different books usually kept in a merchant's office. They should be prepared to journalize a series of transactions from a waste book, and, having posted the entries to the ledger, to balance the accounts, to prove the correctness of the postings by a trial-balance, and finally to exhibit an account of profit and loss, and a balance sheet.

35. Candidates should be prepared to draw the usual commercial forms, such as receipts, bills of exchange, promissory notes, invoices, account sales, accounts current, bills of parcels, and to explain the meanings of technical terms used in general business.

36. Text Books:—
Rudimentary Book-keeping (*Weale's Series*).
Kelly's Elements of Book-keeping (*Simpkins and Co*).
Examination-Questions in Book keeping by Double Entry, by the Rev. J. Hunter, M.A. (*Longmans and Co*).

*** "The number of candidates this year is higher than on any former occasion; but the average quality of the work performed is not high—neither absolutely nor as compared with the work of former years; and notwithstanding the exhibition of much careful labour, and of some excellent results, the prevailing characteristic of the year's product in this department is mediocrity."

III.—Algebra.

Examiner.—J. J. Sylvester, Esq., M.A., F.R.S.

37. Elementary Operations and Fractions. Simple and Quadratic Equations and Problems leading to them. Involution and Evolution. Surds. Arithmetical and Geometrical Series. Combinations and Permutations. Binomical Theorem.

38. Text Books:—Todhunter's Algebra (*Macmillan*), Colenso's Algebra (*Longmans*), Lund's, or any other modern treatise on Algebra.

*** "Of the 81 candidates, three may be selected as evincing a considerable degree of mathematical power—others show very good ability. In all, thirteen have obtained first-class certificates; twenty-eight, second-class certificates; twenty-eight, third-class certificates; and twelve have failed. The general character of the answering has been creditable."

IV.—Geometry.

Examiner.—Rev. B. Morgan Cowie, M.A.

39. A facility in solving geometrical theorems and problems, deducible from the first six books of Euclid, will be expected on the part of those who desire to obtain certificates of the first or second class.

40. Text Book:—Euclid, Books I., II., III., IV., VI., XI., as far as Prop. 21; Pott's smaller edition (*Parker*).

*** "The general character of the papers I have examined is satisfactory; more of the candidates than heretofore have shown some power of solving problems; and, generally, the appreciation of the strict logical method is shown by the accuracy of most of the answers, even when few in number."

V.—Mensuration.

Examiner.—John Sykes, Esq., M.A.

41. The calculation of the areas and circumferences of plane figures bounded by arcs of circles or right lines, and

solid contents of cones, cylinders, spheres, &c. Candidates will be expected to be familiar with the different rules for measuring and estimating artificers' work, such as joiners', bricklayers', masons', and plumbers' work, and to be able to prepare estimates of such work from given quantities.

42. Text Books:—Lund's Mensuration, Part III., of his Elements of Geometry and Mensuration. Tate's Mensuration. Young's Treatise on Mensuration (*Simms and M'Intyre*).

⁎ "The papers have not been so well done as last year. No candidate has obtained more than two-thirds of 'full marks,' and the number 'not passed' is larger than it ought to be. In some instances the Preliminary Examinations must have been very elementary. In all cases the work by which the results are arrived at should be sent up. It is not necessary that it should be scrupulously neat, or that the rough work should be carefully transcribed."

VI.—Trigonometry.

Examiner.—Rev. T. G. Hall.

43. In Plane Trigonometry, the formulæ for the trigonometrical functions of the angles, the numerical solution of plane triangles, the use of logarithmic tables, and angular and experimental series.

44. Spherical Trigonometry, Napier's Rules, Solution of Spherical Triangles.

45. Text Books:—Snowball's or Todhunter's Trigonometry, Hall's Trigonometry for Schools (*Christian Knowledge Society*), or any other of the modern treatises on Trigonometry. Mathematical Tables (*Chambers' Series*).

⁎ "The number of candidates continues to be small. Those examined this year passed very creditably—as none exhibited any glaring errors. Of the questions proposed, all but one was successfully attempted."

VII.—Conic Sections.

Examiner.—Rev. Bartholomew Price, M.A. F.R.S.

46. The properties of the three curves treated geometrically; also as deduced from the cone. The principles of projection, orthogonal and central, applied to derive the properties of the Conic Sections from those of the circle.

47. Analytical Conics, including the equations of the straight line, the circle, the three conic sections, and the general equation of the second degree.

48. Text Books:—Puckle's Conic Sections (*Macmillan*). Todhunter's Conic Sections (*Macmillan*). Salmon's Conic Sections (*Longmans*). Drew's Conic Sections (*Macmillan*). Whewell's Conic Sections (*Parker*).

⁎ "The number of candidates who have answered the questions in Conic Sections is still very small. The work, however, is so good that I cannot recommend the omission of the subject. It is evident that considerable thought and study have been bestowed on it; and this cannot be without great benefit to the candidates."

VIII.—Navigation and Nautical Astronomy.

Examiner.—Rev. Joseph Woolley, LL.D.

49. A good knowledge of Plane and Spherical Trigonometry, of the definitions and terms used in Nautical Astronomy, and of the various measurements of time and their mutual conversions will be required, as well as skill in the use of logarithmic tables, and neatness, order, and accuracy in the numerical solutions of problems. The candidate should understand the construction of charts; the nature and laws of circular storms; great circle sailing, &c.; the methods of determining the latitude, longitude, variation of the compass, and error and rate of a chronometer by astronomical observations, with the demonstrations of the formulæ employed; the use of Nautical Astronomical Instruments, &c.

50. Text Books:—The Nautical Almanac (*Murray*). Riddle's Navigation and Nautical Astronomy (*Law*, Essex-street).

⁎ "The number of candidates in these subjects is very small. They all of them show an intelligent knowledge of the principles and of their application. They, however, want accuracy in taking out data from the tables and Nautical Almanac. Candidates cannot be too strongly impressed with the truth that in working examples in these subjects accuracy is everything. The small degree of interest excited by these—to a maritime country like ours—vital subjects, as shown by the paucity of candidates at these examinations, is distressing. Those who will be charged with the duty of navigating our ships seem too easily satisfied with acquiring a knowledge of mere rules, without enquiring into the principles on which they are grounded. Such knowledge must needs be partial and devoid of interest. The navigation schools in the United Kingdom are furnished with a staff of teachers thoroughly competent to instruct both in theory and practice, and it is much to be hoped that the fruits of their labours may become more apparent than they seem hitherto to have been."

IX.—Principles of Mechanics.

Examiner.—Rev. Jonathan Bates, M.A.

51. The properties of matter, solid, fluid, and gaseous.

52. Statics: The composition, resolution, and equilibrium of pressures acting on a material particle; and on constrained particles; machines; attractions.

53. Dynamics; the laws of motion; impact; projectiles; constrained motion; central forces; oscillation.

54. Rigid Dynamics: Motion of a rigid body about a point;—of a free rigid body;—of a system of rigid bodies.

55. Hydrostatics: Pressures of fluids; equilibrium of floating bodies; specific gravity; elastic fluids; machines; temperature and heat; steam; evaporation.

56. Hydrodynamics: Motion and resistance of fluids i tubes, &c.; waves and tides.

57. Pneumatics: Mechanical properties of air; the barometer, and other machines illustrating the mechanical properties of air.

58. Text Books:—Todhunter's Statics, or Parkinson' Mechanics. Goodwin's Mathematics. Miller's, Phear's, or Webster's Hydrostatics. Webster's Theory of Fluids. The treatise on this subject in Orr's Circle of the Sciences. Golding Bird's Elements of Natural Philosophy, by C. Brooke (*Churchill*). Lardner's Handbooks on Natural Philosophy.

⁎ "Again it is my very pleasing duty to be able to report considerable improvement in the papers submitted to my notice. They are especially marked, on this occasion, by evidences of considerable acquaintance with the subjects of examination. Still I am desirous to impress upon all the candidates the necessity of seeking after greater perspicuity and method in the arrangement of their replies to the questions proposed by the Examiner, inasmuch as such an acquirement not only counts for much in an examination, but must be of great service in all their subsequent commercial or professional pursuits."

X.—Practical Mechanics.

Examiner.—T. M. Goodeve, Esq.

59. The Applications of the Principles of Mechanism to Simple Machines. The Steam Engine.

60. Text Books:—Bourne's Catechism of the Steam Engine (*Longmans*). Scott Russell on the Steam Engine. Nasmyth's Elements of Mechanism, with remarks on Tools and Machinery (*Weale*). Goodeve's Elements of Mechanism (*Longmans*).

*** "The papers are of very fair average merit, and those candidates who have experienced a disappointment in not obtaining the higher distinctions, will understand that without careful reading and study it is impossible to master the intricacies of this subject."

XI.—Magnetism, Electricity, and Heat.

Examiner.—Charles Brooke, Esq., M.A., F.R.S.

61.—Construction and Properties of Magnets; Magnetic Instruments; Terrestrial Magnetism; Diamagnetism.

62. Statical or Franklinic Electricity; Voltaic Electricity; Electro-dynamics; Electro-telegraphy; Electro-metallurgy; Thermo-Electricity; Organic Electricity.

63. Conduction, Convection, and Radiation of Heat; Instruments for measuring Heat; Specific and Latent Heat; Reflection and Refraction of Heat; Diathermancy.

64. Text Books:—Golding Bird's Elements of Natural Philosophy, by C. Brooke (*Churchill*). Lardner's Handbooks of Natural Philosophy (*Walton and Maberly*). Fleeming Jenkin's report on the Electrical Instruments in Class XIII. of the Exhibition of 1862, for Electro-telegraphy. Herschel's Discourse on the Study of Natural Philosophy (*Longmans*) for a *general* view of the subjects.

*** "I am happy to be able to record on the present occasion a very satisfactory progress in the study of these subjects, as shown by the increased number of candidates, and by the general character of the answers. A suggestion contained in the last report, as to the value and importance of the more practical bearings of these subjects, appears to have been not unfruitful; still electro-telegraphy does not receive the attention from students that its political and commercial importance demands. This may in some degree be due to the want of a good elementary treatise on the subject; a want that will be in a great measure satisfied by the able report of the present state of that science by Mr. Fleeming Jenkin, comprised in the Jury Report of Class XIII., in the recent International Exhibition."

XII.—Astronomy.

Examiner.—James Glaisher, Esq., F.R.S.

65. The principles of Plane Astronomy.

66. Text Books:—Herschel's Astronomy (*Longmans*); first chapters. Airy's Lectures on Astronomy. Maddy's Elements of Astronomy. Practical Astronomy (Orr's Circle of the Sciences).

*** "The papers this year are different from those of any preceding year. They show a somewhat extensive, and in some respects, careful reading, but they are almost totally deficient in practical application, and no attempt was made of investigation of formulæ. So far as the Examiner is able to infer, it would seem that the candidates' acquired knowledge of Astronomy has not been based upon Geometry and Trigonometry, and consequently they are unable, from the want of mathematical training, notwithstanding that they seem to have read some Algebra, to express geometrically the knowledge they have acquired, and hence the cause of the failure of practical application. He advises future candidates to study Geometry well, it will enable them to understand their work better than confining themselves to analytical reading."

XIII.—Chemistry.

Examiner.—A. W. Williamson, Esq.

67.—Inorganic. Chemistry of the metalloids and metals, laws of combining proportions, volumes of gases, vapours, &c. Organic. Composition, properties, and decompositions of alcohols, acids, &c.

68. Candidates are expected to be able to explain decompositions by the use of symbols. Questions illustrative of general principles will be selected from the following, amongst other manufactures: Metallurgy of Lead, Iron, and Copper; Bleaching, Dyeing, Soap-boiling, Tanning; the manufacture of Coal-Gas, Sulphuric Acid, &c.

69. Text Books:—Fownes' Manual of Elementary Chemistry. Miller's Elements of Chemistry.

*** "The large proportion of first class certificates awarded is an evidence of the generally high character of the answers, and I observe with particular satisfaction that those questions which relate to combining proportions by weight, or by volume, are better answered than on previous occasions. The least commendable answers are generally those relating to analytical operations, and the great majority of the candidates would be much benefited by the practical teaching of the laboratory."

XIV.—Animal Physiology in relation to Health.

Examiner.—John Marshall, Esq., F.R.S., F.R.C.S.

70. The general principles of Animal Physiology, and the application of them to the preservation of health and to the wants and energies of daily life.

71. Text Books:—Carpenter's Animal Physiology, 1859 (*Bohn*). Lardner's Animal Physics (*Walton and Maberly*). Translation of Milne Edwards' Manual of Zoology (*Renshaw*). Marshall's Description of the Human Body, with Atlas (*Day and Sons*), for details of Anatomy.

*** "I am glad to be able to record a decided improvement in the character of the papers as compared with those of last year. It is satisfactory to find that the applications of Physiology to the preservation of Health, have evidently attracted the attention of the candidates; but it is necessary for them ever to bear in mind that accuracy of scientific knowledge must after all be the test in an examination. I mention this because some who have written most have not always written best. I am glad to find a smaller number of immature students in this year's list than there were last year."

XV.—Botany.

Examiner.—Daniel Oliver, Esq., F.R.S., F.L.S.

72. Sect. I. Vegetable Physiology. The general Structure of a Plant. The manner in which the organs perform their several functions; and the influence exercised by external agents. The nature of their principal tissues. The application of such facts to practical purposes.

73. Text Books:—Lindley's Theory and practice of Horticulture (*Longmans*); or the same author's School-Botany, the edition of 1854, or any later one. (*Bradbury and Evans.*)

74. Sect. II. Practical Botany. The meaning of Botanical Terms. The general facts relating to Botanical Classification, excluding that of Linnæus. The Distinctions of some of the principal English Natural Orders of Plants *not* Cryptogamic. Naming Plants not Cryptogamic at sight. The art of describing Plants correctly. (For this living specimens will be provided.)

75. Text Books:—Lindley's School Botany and Descriptive Botany (*Bradbury and Evans*).

76. Candidates will be expected to return four correct answers to questions in Sect. I., and six in Section II.; each Botanical description standing for one answer. The

questions in both sections will have reference exclusively to subjects having some practical application. Students are earnestly recommended to practice as much as possible the art of describing plants correctly, and precisely in the manner required by the great Linnæus, whose method is fully explained in "Descriptive Botany," now forming a part of "School Botany." They should also apply themselves diligently to the study of the wild or common hardy garden plants to which they may have access. A knowledge of Field Botany will rank much higher with the Examiner than mere Botany picked up in books.

⁎ "Answers have been sent up from but three candidates. They are all very fair and indicate considerable acquaintance with both theoretical and practical botany. None of them, however, attempt to describe the ovary and fruit of the oak and hazel, and none correctly distinguish rye from barley. I return one in the second, two in the third class."

XVI.—Agriculture.

Examiner.—J. C. Morton Esq.

77. Half-a-dozen questions will be put on each of the three principal departments of Agriculture, viz.:—(1) The tillage, drainage, and manuring of the soil; (2) The cultivation of plants; (3) Live-stock management and the meat-manufacture. A certificate will be easily obtained by any one able to direct the labour of the farm, who has been accustomed to consult any of the standard works on English Agriculture.

⁎ "The single paper submitted indicates knowledge derived from books rather than experience, and is imperfect accordingly."

XVII.—Mining and Metallurgy.

Examiner.—J. Arthur Phillips, Esq.

78. Candidates should be able to identify with facility the ores of the more common metals, and be acquainted with their chemical composition. They should also be familiar with the forms of occurrence of the various metallic ores, and the usual methods employed for their extraction and subsequent purification by crushing, stamping, and washing, &c. Underground surveying, principles of ventilation, particularly as applicable to collieries. A knowledge of furnace assaying, and a general acquaintance with the metallurgy of the more important metals.

79. First-class certificates can be given to those only who have either acquired some practical knowledge of mining, or who possess a special acquaintance with the metallurgy of at least one of the useful metals.

80. Text Books:—Dana's Mineralogy (*Trubner and Co.*, Paternoster-row). Mitchell's Assaying (*Baillière*). Manual of Metallurgy (*Griffin*). Useful Metals and their Alloys (*Houlston and Wright*). Ure's Dictionary of Arts, Manufactures, and Mines (*Longmans*). Percy's Metallurgy (*Longmans*). Metallurgy of Iron, Truran (*Spon*).

⁎ "No. 327 is an excellent paper, and the writer is evidently well acquainted with the subject. None of the others exhibit a degree of excellence worthy of special remark."

XVIII.—Political and Social Economy.

Examiner.—Charles Neate, Esq., M.A.

81. Text Books:—Adam Smith (M'Culloch's edition). Principles of Political Economy, by John Stuart Mill.

82. Some knowledge of the Commercial, Financial, and Statistical History of the United Kingdom will be required, for which "Porter's Progress of the Nation," "M'Culloch's Commercial Dictionary," and Merivale's Lectures on Colonisation and the Colonies" (new edition) may be consulted.

N.B.—The Principles of Political Economy, by John Stuart Mill, need be studied only by those who aspire to a first-class certificate.

⁎ "With the one rather remarkable exception, which placed in the first class, none of the candidates appear to have studied to any purpose the subjects included under the head of Political Economy."

XIX.—Domestic Economy.

Examiner.—The Very Rev. Richard Dawes, F.R.S., Dean of Hereford

83. By this is meant a knowledge of the management of household matters, and the principles on which they are conducted; the "why and the wherefore" of everything under this head. For instance as regards food, animal and vegetable, how differing in nutriment, &c., cookery, &c.

84. Clothing of various kinds, how best fitted for varying climates, seasons, and occupations, &c.

85. The Sanitary regulations of the house, such as ventilation, warming and lighting, drainage, &c. A knowledge of the weights and measures by which the prices of provisions, &c., are regulated; in fact, how to make the most of a small income.

86. A knowledge also of the principles of the Savings Bank, and of the accumulation of small savings, of the Benefit Society, of present and deferred annuities.

87. Text Books:—A Manual of Domestic Economy, by Tegetmeier (*Home and Colonial School Society*).

Household Economy, by Margaret Brewster (*Constable and Co.*)

Domestic Economy, by Esther Copley (*Groombridge and Son*).

⁎ "The number examined in this subject is again a small increase upon the preceding year; and, although only one has reached the first class, the greater part of them have shown a creditable knowledge of the subject, which may be of use to them in after life."

XX.—Geography.

Examiner.—William Hughes, Esq., F.R.G.S.

88. All candidates will be expected to possess a sound knowledge of Elementary Geography, both physical and descriptive. Such knowledge will of necessity embrace an acquaintance with at least the outline of the great natural features of the globe, the political divisions of countries, and the localities of towns and other places of importance. This kind of knowledge will be looked for in fuller extent with regard to the British Islands, and the various portions of the British Empire, than in respect of other countries. The growing importance of the colonial dependencies of Britain renders a knowledge of their geography more than ever necessary in the present day. The North American and Australian colonies of Britain are hence proposed as a subject for more especial study on the part of the intending candidates for the ensuing year's examinations, and their attention is directed to them accordingly. In evidence of the knowledge possessed regarding those regions, the candidate will be required to sketch, from memory, a map of any one of the North American or Australian colonies that may be named by the examiner. It will not of course be expected that such sketches should possess accuracy of detail, but they should at least show the general direction of coast-lines, mountain-chains, or river-courses, with the localities and names of the principal towns.

89. In addition to the above, candidates who aim at the highest class of certificate should be prepared to answer questions bearing upon Geography in its relation to the Physical Sciences and the History of Mankind—such questions, that is, as involve a general acquaintance with the subject of Climate, the laws of Meteorology, the Distribution of Plants and Animals over the Globe, the leading outlines of Geology, the Ethnographic Division of the Human race, and the commercial resources of different lands. This kind of knowledge is looked for, not in place of geographical knowledge of a more elementary kind, but as supplementary to it, and throughout based upon it.

90. Text Books:—

Manual of Geography, by William Hughes (*Longmans*).

Guyot's Earth and Man (*Parker and Son*).

Physical Geography, by Sir John F. W. Herschel (*A. and C. Black*).

Page's Introductory Text Book of Geology (*Blackwood*).

The General Atlas (*Published by the National Society*).

The School Physical Atlas (*either Johnstone's or that published by the National Society*).

*** "The impression which I derive from the Examination papers of this year is favourable to the industry of the candidates. The number of failures is fewer than upon some former occasions. But it is from the evidence supplied in a large majority of the answers, of patient and thoughtful labour bestowed upon the effort to master the less attractive details of the subject, that I chiefly form my conclusions. Comparing them with my recollections of former examinations, the papers show a clearer appreciation on the part of the writers of the meaning and purpose of geography, and a fuller determination to pay regard to its humbler elements in preference to indulgence in the mere generalities which often assume a more seductive aspect to the learner. The advance made in this regard is altogether in the right direction."

XXI.—English History.

Examiner.—C. H. Pearson, Esq., M.A.

91. English History and English Constitutional History.

Text Books:—The Student's Hume. Creasy's Rise and Progress of the English Constitution.

92. Special subject:—The Reign of Charles II.

Text Book:—The chapters relating to this subject in Lingard's History of England.

*** "The papers are below the average of former years, both in the number of those that deserved to be placed high, and in the quality of those that were best comparatively. One great cause of this was that very few students had prepared their work out of the text-books recommended, and 'Creasy's Growth of the English Constitution' had been specially neglected. This omission to prepare a subject set, of course told seriously against all who had been guilty of it. Candidates will do well to remember that the object of the Examination in History is not merely to elicit a knowledge of names, or dates, and perhaps of a few trivial stories, but to test the writer's power of understanding past times as he understands his own. In such a book as the 'Student's Hume' the succession of events is given; in 'Creasy,' the structure of the Constitution is explained, with special reference to its gradual development; and as a man who knows one subject fairly well is alive to his own deficiencies in other matters, the study of a special period in some more elaborate work than a manual is always recommended. The whole benefits of this plan are lost if the Candidate confines himself to one book. Some even appeared to have prepared their work from some text-book of a slighter character than the 'Student's Hume.'"

XXII.—English Literature.

Examiner.—Rev. Samuel Clark, M.A., F.R.G.S.

93. Any two, but not more than two, of the authors in the following list may be taken up for examination:—

Chaucer.—The Prologue to the Canterbury Tales.

Shakspere.—King Lear; Richard II.; The Merchant of Venice.

Bacon.—Essays.

Craik.—Outlines of the History of the English Language.

94. Candidates are recommended to make a very careful study of the text of the authors they may select. The questions on each author will be divided into two sections, the first intended to test the candidate's acquaintance with the text, the next his knowledge of the subject-matter and his critical and literary information. Full marks will not be given for answers in the second section, if those in the first section do not prove satisfactory.

*** "No one of the candidates is equal to the best of last year, but the average is not inferior. An increasing tendency has shown itself in the candidates, during the last four years, to prefer the papers on Shakespeare and Milton, and that on the English language."

XXIII.—Logic and Mental Science.

Examiner.—J. F. Ferrier, Esq., LL.D.

95. Logic: Candidates will be expected to answer questions on the different processes of thought, and on the connexion of thought and language. Every Candidate must attempt to analyse examples of reasoning, and to detect fallacies.

96. Text books:—Whateley's Elements of Logic, or Thomson's Outline of the Laws of Thought.

97. A Candidate for a second or third-class Certificate will be expected to prepare, in addition, any one of the following books which he may select:—Mill's System of Logic, Book III., of Induction; Bishop Butler's Sermons; Paley's Moral Philosophy; Dugald Stewart's Philosophy of the Human Mind, Volume I.

98. A Candidate for a first-class Certificate will be expected to prepare any two of these works which he may select.

*** "In logic, with scarcely an exception, the candidates have acquitted themselves creditably; but they are not so well prepared on the books which they professed. On the whole, the examination has been satisfactory; indeed, highly so, when the very rare cases of failure are considered."

XXIV.—Latin and Roman History.

Examiner.—Rev. F. Temple, D.D.

99. Sallust. Bell. Cat.

Virgil. Æneid, Book vi.

Roman History to the death of Augustus Cæsar.

100. Text Book:—Liddell's History of Rome in one volume.

*** "The work, on the whole, is not so good as it was last year. The parsing is perhaps a little better, but the translations are inferior, and the history still more so."

XXV.—French.

Examiner.—Alphonse Mariette, Esq., M.A.

101. The Examination paper will be divided into three parts.

102. The first will comprise grammatical questions and an extract from a modern French writer to be translated

into English. Candidates aiming at a 3rd class certificate should confine themselves to this first part.

103. The second part will comprise an English extract to be translated into French, and a list of idiomatic expressions to be rendered from French into English, or *vice versâ*. This should be done satisfactorily by the candidate who aims at a 2nd class certificate.

104. In the third part, candidates for a 1st class certificate will have, in addition to a portion of the above, to answer properly (*in French*) some *elementary* questions on the two following subjects:—

1. French literature in the second half of the 17th century, comprising the great writers who were born between the years 1620 and 1650 from (Molière to Fénélon).

2. The History of France, from the Revocation of the Edict of Nantes to the death of Louis XIV. (1685-1715).

105. Books recommended:—Nisard: Histoire de la Littérature Française (*Williams and Norgate*, London and Edinburgh), or Barrère, Ecrivains Français (*Williams and Norgate*). Duruy: Histoire de France (*Williams and Norgate*).

*_** "I am not quite so satisfied this time with the French papers as I was last year. True, as compared with the results of four or five years ago, we are still considerably in advance, and the proportion of candidates entitled to certificates is quite as large this year, I think, as it has ever been; but the first class papers are very few, and even in those the literature and history bear decided marks of *cramming*, being wanting in originality of thought and freedom of style; whilst the translation from English into French is very unsatisfactory."

XXVI.—German.

Examiner.—Dr. Bernays.

106. Schiller's Geschichte des Abfalls der Niederlande.
Schiller's Maria Stuart.
Göthe's Tasso.
Kohlrausch's Deutsche Geschichte.

107. Pieces from each of the above works will be given for translation, at the choice of the candidate. Every candidate must translate one piece. First-class certificates will be given to those only who translate *well* from English into German, and write in German a well-expressed Essay on a subject which will be announced to them when they come up for examination.

*_** "There is a decided improvement in the work upon former years. The translations from German into English were in nearly all the papers excellent; and those from English into German very promising. The weakness appeared in the composition, and the majority of candidates ventured upon writing an essay when they ought to have contented themselves with answering more of the questions, by which they would have obtained marks which they could not earn by a feeble composition."

XXVII.—Freehand Drawing.

Examiner.—F. S. Cary, Esq.

108. In freehand drawing the Candidate will be required to show a practical knowledge of the principles usually applied in the imitation of natural and artificial forms, such as furniture, manufactured articles, ornament, foliage, and the human form.

*_** "The number of candidates in this subject has been gradually increasing at each successive examination; this time the number greatly exceeded that of any former year. When the examinations were first commenced there were less than twenty candidates for two or three years; this year between seventy and eighty have sent in drawings. This great increase in the numbers is highly satisfactory, being a proof of the value that is set upon the certificates of the Society of Arts as well as showing how much drawing, as a useful art, is spreading throughout the country. Last year the drawings were better than those of any previous year, and I am glad to be able to say they have not fallen off on the present occasion."

XXVIII.—Geometrical Drawing.

Examiner.—Thomas Bradley, Esq.

109. Practical Geometry, or Geometrical Drawing, required by the Mechanist, Engineer, Builder, and all in any way employed in the art of construction. The Candidate will be examined in Practical Plane Geometry, the construction of right line figures of given areas, and of curve lines required in the arts, &c.; in Practical Solid Geometry, Elementary Problems on the line and plane, and their combinations, the representation by orthographic projection of simple solids from conditions, and in the principles of Development as used in the construction of Maps, &c.; and in Elementary Perspective Projection as far as it is required by the Architect.

110. Text Books:—Geometry, Plane, Solid, and Spherical (*Library of Useful Knowledge*) is especially recommended as a work to be studied on Theoretical Geometry. —Elements of Geometrical Drawing, published by the Committee of Council on Education, 2 parts (*Chapman and Hall*).—Hall's Elements of Descriptive Geometry for Students in Engineering. Heather's Descriptive Geometry. Also the following French Works, which are mentioned in consequence of the great deficiency in English Works on Geometrical Drawing:—Elémens de Géométrie Descriptive, par S. F. Lacroix; Traité de Géométrie Descriptive, par Lefebure de Fourcy; Nouveau Cours raisonné de Dessin Industriel, par Armengaud, aîné, et Armengaud, jeune, et Amouroux; Bardin's Works on Descriptive Geometry.

*_** "Misled, perhaps, by the title 'Geometrical Drawing,' the candidates appear to be not yet aware of what is expected from them. 'Practical Geometry' implies more than the application of simple deductions from the six books of 'Euclid.' The draughtsman must be able not only to draw a circle through three given points, but to determine and draw a sphere which has four given points on its surface. The constructions required by the examination paper did not require so much as this very elementary knowledge, and yet few have succeeded. There is, however, a perceptible improvement manifested in knowledge of Plane Geometry, and in neat accurate drawing."

XXIX.—Theory of Music.

Examiner.—John Hullah, Esq.

111. Notation, the modern modes, intervals, time signatures, the stave, transposition, modulation, terms and characters in common use.

112. The Elements of Harmony.

113. Musical History and Biography.

114. Arrangements must be made, in the Previous Examination by the Local Boards, to test Candidates, by oral examination, in their knowledge or appreciation of the *sound* of musical successions and combinations. A form of the test to be used for this purpose by the Local Board at the Previous Examination will be sent by the Council to such Local Boards as may *apply for it*, in due time before the Examination.

*_** "The best papers of this year are, I think, inferior to the best of last year; but the number of fairly good ones is certainly greater. It would seem that the higher branches of Musical Theory do not find an increasing number of students among our candidates, but that the rudiments are much more carefully taught than heretofore."

PRIZES FOR 1864.

THE PRINCE CONSORT'S PRIZE.

115. His Royal Highness the late President of the Society was pleased to offer annually to the candidate who, obtaining a certificate of the first class in the current year, shall have obtained in that year and the three years immediately preceding it, the greatest number of such certificates, a Prize of Twenty-five Guineas, and this Prize Her Majesty the Queen has graciously intimated her intention to continue. This Prize cannot be taken more than once by the same candidate. It will be accompanied by a certificate from the Society of Arts, setting forth the special character of the Prize, and the various certificates for which it was granted.

GENERAL PRIZES.

*** No Prize in any subject will be awarded to a Candidate who does not obtain a Certificate of the first-class therein.

1. Arithmetic	First Prize, £5. Second Prize, £3.
2. Book-keeping ...	First Prize, £5. Second Prize, £3.
3. Algebra	First Prize, £5. Second Prize, £3.
4. Geometry	First Prize, £5. Second Prize, £3.
5. Mensuration... ...	First Prize, £5. Second Prize, £3.
6. Trigonometry ...	First Prize, £5. Second Prize, £3.
7. Conic Sections ...	First Prize, £5. Second Prize, £3.
8. Navigation and Nautical Astronomy...	First Prize, £5. Second Prize, £3.
9. Principles of Mechanics	First Prize, £5. Second Prize, £3.
10. Practical Mechanics.	First Prize, £5. Second Prize, £3.
11. Magnetism, Electricity, and Heat ...	First Prize, £5. Second Prize, £3.
12. Astronomy	First Prize, £5. Second Prize, £3.
13. Chemistry	First Prize, £5. Second Prize, £3.
14. Animal Physiology (in relation to Health).	First Prize, £5. Second Prize, £3. Additional by Gift of Harry Chester, Esq.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
15. Botany	First Prize, £5. Second Prize, £3.
16. Agriculture	First Prize, £5. Second Prize, £3. Additional by Gift of J. C. Morton, Esq.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
17. Mining and Metallurgy	First Prize, £5. Second Prize, £3. Additional by Gift of Sir Thomas Phillips, F.G.S.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
18. Political and Social Economy... ...	First Prize, £5. Second Prize, £3.
19. Domestic Economy...	First Prize, £5. Second Prize, £3.
20. Geography	First Prize, £5. Second Prize, £3.
21. English History ...	First Prize, £5. Second Prize, £3. Additional by Gift of Sir C. Wentworth Dilke, Bart. Third Prize, £2; and Three Prizes of Books, value £1 each.
22. English Literature ...	First Prize, £5. Second Prize, £3. Additional by Gift of Sir C. Wentworth Dilke, Bart.:— Third Prize, £2; and Three Prizes of Books, value £1 each.
23. Logic and Mental Science	First Prize, £5. Second Prize, £3.
24. Latin and Roman History	First Prize, £5. Second Prize, £3.
25. French	First Prize, £5. Second Prize, £3.
26. German	First Prize, £5. Second Prize, £3.
27. Freehand Drawing...	First Prize, £5. Second Prize, £3.
28. Mechanical Drawing.	First Prize, £5. Second Prize, £3.
29. Theory of Music ...	First Prize, £5. Second Prize, £3.

LIST OF LOCAL EDUCATIONAL BOARDS.

The following is a List of the places at which Local Boards have already been formed, with the names of the Secretaries, from whom intending Candidates and others may obtain information relative to the Examinations:—

Local Boards.	Secretaries.
Aberdeen	Mr. James Sinclair, Mechanics' Institution, Aberdeen.
Accrington	Mr. H. G. Duffield, Accrington.
Airdrie School of Arts, and Mechanics' Institution.	Mr. Boyd M. McCrae, Airdrie.
Aldershot and Farnham District	Mr. Barrow Rule, M.C.P., Principal of the Classical and Mathematical School, Aldershot.
Ashford	Mr. F. Garaway, Schoolmaster, Ashford New Town.
Bacup	Mr. Thos. Newbigging, Bacup.
Banbridge (Ireland) Literary and Mutual Improvement Society	Mr. Alexander Black, Banbridge, County Down, Ireland
Banbury	Mr. John H. Beale, Banbury.
Barnet	Mr. John Thimbleby, Barnet.
Belfast	Rev. Wm. C. McCullagh, Ballysillan, Belfast.
Birmingham and Midland Institute	Mr. Thos. Martineau, Solicitor, Cannon-st., Birmingham.
Bishop's Stortford	Mr. F. Woodham Nash, B.A., Sion House, Birchanger, Bishop's Stortford.
Blackburn	Mr. William Gourlay & Mr. J. H. Margerison, Blackburn.
Blandford	Mr. Jas. B. Green, Architect and Surveyor, Salisbury-street, Blandford.
Bradford	Mr. D. J. Crebbin, Schoolmaster, Chapel-street, Bradford.
Brighton (for Sussex)	Mr. Barclay Phillips, 75, Lansdowne-place, Brighton.
Bristol	Mr. J. F. R. Daniel, Athenæum, Bristol.
Brompton (near Chatham)	Mr. J. Greenleaf, 8, Prospect-row, Brompton, Chatham.
Bucks and Berks Adult Education Society, Windsor	Rev. Thomas Rooke, M.A., St. Alban-street, Windsor.
Bury (Lancashire)	Mr. Edmund Bunting, Athenæum, Bury.
Bury St. Edmund's	Mr. John Jackson, Head Master of the Commercial School, Bury St. Edmund's.
Canterbury	Rev. Edward Gilder, M.A., Canterbury.
Carlisle Church of England Association	Mr. Thos. Harris, Stationer, 51, Castle-street, Carlisle.
Carlisle Mechanics' Institute	Mr. W. A. Williamson, Mechanics' Institute, Carlisle.
Chelmsford	Mr. W. Cutts and Mr. Jesse Garrood, Chelmsford.
Croydon	Mr. Francis Warren, Bookseller, 131, High street.
Darlington	Mr. Geo. S. Gibbs, Haughton-le-Skerne, Darlington.
Deptford	Mr. Thomas Earland, 2, Wellington-grove, Greenwich-road, S.E.
Derby	Mr. H. M. Holmes, Hon. Local Sec. to the Society of Arts, London-road, Derby.
Devonport	Mr. Wm. Mogg and Mr. Samuel Chapple, Mechanics' Institute, Devonport.
Farsley (near Leeds) Mechanics' Institution (Yorkshire Union)	Mr. James Cockshott, Grocer, Farsley, near Leeds.
Faversham	Mr. Frederick W. Monk, Managing Director of the Faversham Institute.
Gilford (Ireland) Young Men's Mutual Improvement Society	Dr. Henry McBride, M.D., Gilford, Co. Down, Ireland.
Glasgow Athenæum	Mr. Moses Provan, Accountant, 110, West George street, Glasgow.
Glasgow Institution	Mr. John Craig, F.E.I.S., Glasgow Institution, 37, Cathedral-street, Glasgow.
Glasgow Mechanics' Institution	Mr. Robert McIntyre, Director, &c., 105, South Portland-street, Glasgow.
Glasgow Popular Evening Classes, Andersonian University	Mr. George Martin, 26, Scotia-street, Glasgow.
Gosport and Alverstoke Literary and Scientific Institution	Mr. William Short, 56, High-street, Gosport.
Greenwich	Mr. Jas. Spencer, 3, Wintown-place, Greenwich, S.E.
Halifax Mechanics' Institution	Mr. A. C. Foster, Solicitor, 1, Westgate, Halifax.
Halifax Working Men's College	Mr. Geo. Gibb, Haley Hill, Halifax.
Hartlepool (West)	Mr. Thos. Preston Brunton and Mr. John Thomas Belk Solicitors, West Hartlepool
Hertford	Mr. John Marchant, jun., Port-vale, and Rev. Edward Bartrum, M.A., Head Master of Hale's Grammar School, Hertford.
Hitchin	Mr. Joseph Pollard, High-down, near Hitchin.
Holmfirth	Mr. J. Batley, South-lane, Holmfirth.
Idle, near Leeds (Yorkshire Union)	Mr. James Hall, Idle.
Ingrow-cum-Hainworth	Mr. Jackson, Ingrow-cum-Hainworth.
Ipswich	Mr. Edwin Barrett, 31, Cornhill, & Mr. Herbert Wright, 44, Handford-road, Ipswich.
East Lancashire Union of Mechanics' Institutions, Burnley	Mr. John Sutherland, Post-office, Burnley.
Leeds West Riding Union	Mr. Barnett Blake, Agent of the Yorkshire Union of Mechanics' Institutions. Mr. John Pickering, Secretary of the Leeds Mechanics' Institution.
Leeds Young Men's Christian Association	Mr. J. K. Dall, B.A., 9, East-parade, Leeds.
Leicester	Rev. D. J. Vaughan, St. Martin's Vicarage, Leicester.
Lichfield	Rev. R. M. Grier, B.A., Lichfield.
Liverpool	Rev. A. Hume, D.C.L. and LL.D., 24, Clarence-street, Everton.
Lockwood	Mr. Alfred Lee, Mechanics' Institution, Lockwood.
London, City of London College, Sussex Hall, London, E.C.	Mr. W. H. Hansen, City of London College, Sussex Hall, Leadenhall-street, E.C.

London, Mechanics' Institution	Mr. T. A. Reed, 41, Chancery-lane, W.C.
,, Polytechnic Institution (Limited)	Mr. James Cousins, Polytechnic Institution.
,, St. Stephen's, Westminster	Mr. Samuel Elliot, Emery Hill's School, Rochester-row, Westminster, S.W.
,, St. Thomas, Charterhouse, Evening Classes	Rev. R. Holme, 7, Charterhouse-square, E.C.
,, St. James's, Westminster (Metropolitan Association)	Mr. Joseph Randall, 45, Marshall-street, Golden-square, W.
,, Hackney (Metropolitan Association) ...	Mr. H. Gray, Working Men's Institute, Triangle, Hackney, N.E.
,, Lambeth (Metropolitan Association) ...	Mr. E. Heller, Hercules'-buildings, Lambeth, S.
,, Spitalfields and Bethnal-green (Metropolitan Association) ...	Mr. T. N. Day, Christ Church School, Spitalfields, N.E.
Louth	Mr. Benjamin Crow, Mechanics' Institution, Louth.
Lynn (King's)	Mr. T. Burton, 16, Buckingham-terrace, Lynn.
Macclesfield	Mr. George Stewart, Master of the School of Art, Beech-lane, Macclesfield.
Manchester	Mr. Edwin Simpson, Manchester Mechanics' Institution.
Marske (near Redcar) Literary Society (Yorkshire Union)	Mr. Robt. Richardson, Marske, near Redcar.
Middlesbro'	Mr. William Taylor, Mechanics' Institute, Middlesbro'.
Newbury	Mr. T. Gurney, Newbury.
Newcastle-on-Tyne, Church of England Institute	Mr. Joseph Forster, St. John's School, Newcastle-on-Tyne.
Newcastle-on-Tyne Mechanics' Institution	Mr. Adam Carse, 18, Mosley-street, Newcastle.
Nottingham	Dr. W. Tindal Robertson, Nottingham.
Oldham	Rev. John Hodgson, Queen-street, Oldham.
Paisley	Mr. Charles Dalton Wason, Teacher, St. George's School, Paisley.
Pembroke Dock	Mr. T. H. Eastlake, H.M. Dockyard, Pembroke Dock.
Peterborough	Mr. C. T. Cotton, Long-causeway, Peterborough.
Poole	Mr. Edwin Sloper and Mr. Robert Belben, Accountants, Longfleet, Poole.
Portsmouth	Mr. Andrew Murray, H.M. Dockyard, Portsmouth.
Richmond	Rev. W. Bashall, A.M., 3, Cambridge-villas, Richmond-hill, S.W.
Rotherham	Mr. Frederick Edwards, Solicitor, and Mr. W. Unwin, Currier, Rotherham.
Ryde	Mr. Benjamin Barrow, F.R.C.S. Eng., M.B.M.S., Ryde.
Salford	Mr. Wm. Noar, Borough Treasurer, Town Hall, Salford.
Scarborough	Mr. Thomas Shields and Mr. John Edmond, Town Hall, Scarborough.
Selby	Mr. William Allison, Bank Manager, Selby.
Sheffield	Mr. T. Rowbotham, People's College, Sheffield.
Skipton	Mr. George Kendall, Skipton.
Slough Mechanics' Institution	Mr. James Chapman, Upton-grove, Slough.
Southampton	Mr. W. Johnson, Athenæum, Southampton.
Southern Counties' Adult Education Society	Rev. R. Fitzgerald, Winslade, Basingstoke.
South Staffordshire Union of Educational Institutes	Mr. J. Jones, The Trindle, Dudley.
Thirsk	Mr. J. G. Baker, Market-place, Thirsk.
Wakefield	Mr. W. S. Banks, Solicitor, Wakefield.
Warminster	Mr. Frank Morgan, Warminster.
Waterford	Mr. James Budd, Thomas-street, Waterford.
Wellingborough	Mr. Thos. S. Curtis, Wellingborough.
Wigan	Mr. James Seward, Diccon-son-street, Wigan.
Wirksworth	Mr. William Tomlinson, Mechanics' Institute, Wirksworth.
Worcestershire Union of Educational Institutes.	Rev. W. Walters, Hanley-grange, Upton-on-Severn, and Mr. Josiah Jones, Worcester.
York	Mr. Charles Cumberland, Institute of Popular Science, York.

An Appendix, containing the forms that will be forwarded at the proper time to the Local Educational Boards, with the Lists of Prizes and Certificates awarded at the last Examination, and other particulars, is attached to separate copies of the Examination Programme. These may be had *gratis* on application to the Secretary of the Society of Arts.

COTTAGES FOR THE LABOURING CLASSES.

SPECIAL PRIZES.

Two prizes of £25 each are placed in the hands of the Council of the Society of Arts by J. Bailey Denton, Esq., to which is added the Society's medal, to be offered for the most approved designs for cottages, with three bedrooms in each, to be built singly or in pairs, at a cost not exceeding £100 each.

They are offered, one for competition among the members of the Architectural Association, and the other to be open to the United Kingdom.

In order to secure a proper sanitary condition, such provisions are to be made as have the sanction of practical experience.

It is deemed necessary that each cottage should contain, on the ground floor, a living room, of about 150 feet superficial; a scullery, or kitchen, of not less than 70 feet superficial, with a ventilated pantry; and, on the upper floor, three bedrooms, one of which must not be less than 100 feet superficial; in two of the bedrooms fire-places should be provided. The height from ground to first-floor should be 9 feet, and the bedroom, or upper floor, be 8 feet clear.

The memorandum of the Inclosure Commissioners with respect to the substantiality of agricultural buildings (as applied by them under the several Improvement Acts) shall be adhered to. (See Appendix in the next column.)

The drawings are to be on a uniform scale of one-eighth of an inch to a foot, and they are to be not fewer than six in number, viz., two plans, three elevations, and one section.

Each design is to be accompanied by a detailed specification, and an estimate stating in full the quantities of all the materials required, and the *cost* price at which they are calculated. Brickwork at £8 per rod reduced; countess slates at 23s.; and Baltic pine timber at 2s. 3d. per foot cube. In regard to other materials and labour the whole are to be calculated at cost price. An allowance of 20 per cent. is to be made for contingencies and builder's profit, with 5 per cent. for the cost of superintendence, so that the *prime cost* of each house must not exceed £80, which amount must include not only the cottage but the fixtures, water supply or well, fencing, paving, and all those necessary addenda which the cottage owner must provide, and which, costing money to provide, he requires interest for in the shape of rent.

In the selection of the plans for premiums, experienced professional assistance will be obtained, and the estimates will be subject to the examination of a competent surveyor. The designs will be submitted to public inspection, if deemed worthy thereof, and the two most approved will be retained for publication or not, at the option of the Council.

The judges will be an architect, a land agent, and a builder, named by the Council of the Society of Arts.

It would be an advantage if each competitor could name a contractor who will undertake the erection of ten pairs of cottages, according to the design and estimate.

The plans, drawings, and specifications must be sent to the Society's House, John-street, Adelphi, W.C., not later than the 1st of January, 1864.

(By order,)

P. LE NEVE FOSTER, *Secretary.*

APPENDIX.

(*Extracted from the Minutes of the Inclosure Commissioners.*)

The Specifications being often found defective, attention is called to the following particulars:—

A minimum depth should be given for the footings of all walls, piers, &c., the top course not to be nearer to the surface of the ground than six inches; also the depth of all cesspools, drains, tanks, &c.

The general drainage of the site and buildings to be fully described.

The number and thickness of the courses to be specified; those of stone to be about one foot thick in one or two courses.

The description and quality of the bricks to be specified, and the following clause inserted in the Specification: "Every header to be a whole brick, and no half-bricks or bats used in any portion of the walls, except as closers to a course."

The description and quality of stone for walling, lintels, sills, quoins, and other dressings, should be given, and it should be specified that proper bond stones are to be built into all walls of their full thickness, so that there shall not be more than five feet from one bond stone to another, either in the same course or in the courses above or below.

The description and quality of the lime to be specified, together with the proportion of sand.

In all cases where fir timber is used, that obtained from Memel or Norway, and battens from Dram, St. Petersburgh, or other Norway or Baltic ports is to be preferred.

All oak used to be of English growth.

No timber to be placed nearer to the inside of any flue than one foot.

All timbers to be cut die square, and to hold the scantlings specified when finished.

Scantlings of Memel or Norway fir, for the timbers of roofs, &c., in the following table, will be sanctioned by the Commissioners, viz:—

Description of Roof.	Span.	Tie Beams.	Principal Rafters.	King Posts.	Queen Posts.	Struts.	Straining Piece.	Sill Piece.	Purlins.	Common Rafters.	Wall Plates.	Pole Plates.
	feet.	in. in.	in. in.	in. in.	in. in.	in. in.	in. in.	in. in.	in. in.	in. in.	in. in.	in. in.
King Post...	18	7½ × 3	5 × 3	4 × 3	...	3 × 2½	...	...	6 × 3½	3½ × 2	4 × 3	4 × 4
	20	8 × 3	5½ × 3	4½ × 3	...	3½ × 2½	...	...	6½ × 3½	3½ × 2	4 × 3	4 × 4
	22	8½ × 3½	6 × 3	4 × 3½	...	3½ × 3	...	...	7 × 3½	4 × 2	4½ × 3	4 × 4
	24	9 × 3½	6 × 3½	4½ × 3½	...	4 × 3	...	...	7½ × 3½	4 × 2	4½ × 3	4 × 4
	26	9½ × 4	6½ × 3½	5 × 3½	...	4½ × 3	...	...	8 × 4	4½ × 2	5 × 3	4 × 4
	28	10 × 4	6½ × 4	5 × 4	...	4½ × 3½	...	...	8½ × 4	4½ × 2	5 × 3	4 × 4
	30	10½ × 4½	7 × 4	5½ × 4	...	5 × 3½	...	...	8½ × 4½	5 × 2	5 × 3	4 × 4
Queen Post	30	9 × 4	5½ × 4	...	4½ × 4	4 × 3	7 × 4	4 × 4	7 × 3½	4 × 2	5 × 3	4 × 4
	32	9½ × 4	6 × 4	...	5 × 4	4 × 3½	7½ × 4	4½ × 4	7½ × 3½	4 × 2½	5 × 4	4 × 4
	34	10 × 4½	6½ × 4	...	5½ × 4	4½ × 3½	8 × 4	5 × 4	8 × 4	4½ × 2½	5 × 4	4 × 4
	36	10 × 5	6½ × 4½	...	5½ × 4½	5 × 3½	8 × 4	5 × 4½	8 × 4½	5 × 2½	6 × 4	5 × 4

The trusses in the above table to be about ten feet apart, and the common rafters fourteen inches from centre to centre.

Joists having a bearing of from 10 to 16 feet, to be 2½ inches in thickness, with 2-3rds of an inch in depth for every foot between bearings, and from 16 to 24 feet, to be 3 inches in thickness, with 5-9ths of an inch in depth for every foot between bearings.

Lintels to be generally 4 inches thick, those to all openings over 3 feet 6 inches wide, to have 1¼ inch in depth for every additional foot of opening by the full width of the wall within the reveal.

Where roofs are covered with duchess or countess slates, the same should not be laid with a lap of less than 3 or 2½ inches; each slate to be fastened with two nails.

When slates of a smaller size are used, the lap should not be less than two inches, and at least every other course double nailed.

Nails for slating to be either copper, zinc, galvanised iron, or nails dipped in oil when in a state of red heat.

The ridges, &c., in all cases to be either covered with lead (6 lbs. to the foot), proper ridge tile crest, set and pointed in cement, or with patent slate ridging with 1, fastened with screws, and set in oil putty.

Flat gutters between roofs, &c., to be laid with lead 7 lb. to the foot.

Cast-iron eaves guttering to be provided to the roofs of all buildings, with proper down-pipes connected to drains to carry off the water; the joints of the guttering and down-pipes to be put together with red lead, and the whole to have two coats of paint before being fixed, and at least one after.

The use of zinc for gutters between roofs, &c., will not be sanctioned.

Especial attention is called to providing an efficient supply of light and ventilation, both in dwelling-houses and farm-buildings, and the means of doing so should be fully described in the specification, and as far as possible shown on the drawings.

All stables, cow and beast-houses, should have ventilation provided in the roofs, as near the ridge as possible, and also, where practicable, long narrow slits should be formed in the gable walls, also near the ridge.

THE GOLDEN PARALLELS.

In a late number of the *Edinburgh Review*, there is a notice of several publications on the subject of gold fields and gold miners. A mass of facts is collected relative to the Australian, Californian, and Columbian gold diggings, and several important conclusions are arrived at. In the first place, we are reminded that the great gold fields already discovered are all included within two regions. The gold-fields of New South Wales and Victoria extend without any interruption along the slopes of the great mountain range which separates the eastern seaboard of Australia from the interior of the continent, and the gold fields of California and British Columbia occur without interruption along the western slopes of the Rocky Mountains. Thus, there are presented two great gold-bearing regions, extending along two widely distant elevations, and probably "owing their auriferous character to some influence connected with their upheaval." The possibility of establishing a connection between these two gold-bearing regions will be understood after a little consideration of their characteristics. The American gold-fields, under various names, run along the eastern seaboard of the Pacific, almost from pole to pole—from Behring's Straits in the north to Cape Horn in the south. Throughout this vast region large quantities of the precious metal are found. "From Chili, in the south, to the British Possessions, in the north, its slopes, spurs, and subordinate ranges are now yielding gold. From Chili we mount through Bolivia, Peru, Equador, New Granada, all still continuing to yield the precious metal, after some three centuries of gold mining. Thence, after we pass the Isthmus, we find the gold miner at work through Mexico, California, Oregon, Washington, till at length we come to the British Possessions, stretching to the shores of the Arctic Ocean." Such is a brief description of the great gold-bearing system of America. Turning now to that of Australia, there is found a coast range running from the extreme northern point of the continent to the extreme southern point. But this range neither begins nor terminates in Australia. It extends across Bass's Straits, on the one hand, and beyond Cape York on the other; in which direction the chain of rocks forms at intervals numerous islands, such as New Guinea, the Carolines, the Ladrones, and others, until Japan, with its gold-bearing rocks, is reached. Thus, in accordance with this theory, the basin of the Pacific has on each side a continuous elevation of volcanic origin. At intervals on both sides gold is now found, from Behring's Straits to New Zealand; and it is stated that at the "beach diggings" in California, a bluish sand, not unlike the pipe clay of Ballarat, is frequently thrown up by the waves, and is found to contain gold in considerable quantities.

The conclusion arrived at by this reasoning is that the great gold fields of the world, as at present known, are included in the vast system of volcanic rocks which surround the Pacific. This chain, though broken here and there, is said to be traceable between Australia and America, and to be easy of identification on both sides of the ocean. Such a continuous and well-marked line of volcanic elevation has often received the attention of geologists. Humboldt's view, which is the one generally accepted on the subject, is that the bed of the Pacific attained its present depth at a comparatively late period; that its unbroken crust, pressed down on the molten mass underneath, caused a quantity of it to rush towards the line of fracture at the edges, and that this disturbed matter found vent in the elevations which are now connected with the gold-fields of America and Australia. So far these considerations, as bearing on the science of geology, are highly important; but it has to be shown in what way gold is to be connected with volcanic shocks in some places and not in others. On this point it is laid down by Sir Roderick Murchison that the rocks which are the most auriferous are of the Silurian age, and that a certain geological zone only in the crust of the globe is auriferous at all. Gold, he states, has never been found in any stratified formations composed of secondary or tertiary deposits, but only in crystalline and palæozoic rocks, or in the drift from those rocks. The most usual original position of the metal is in quartzose veinstones that traverse altered Silurian slates, frequently near their junction with eruptive rocks. Sometimes, however, it is partially diffused through the body of rocks of igneous origin. From this it appears that volcanic eruptions, in connection with Silurian rocks, are to be regarded as the origin of gold formations.

It will have been seen that, according to the volcanic basin theory as described above, the auriferous rocks which surround the Pacific leave Victoria and plunge into the sea to appear again on the other side of Bass's Straits. This would, of course, leave South Australia out of the reach of these gold-bearing ranges. But singularly enough, the reviewer, after remarking upon this termination of the Victorian rocks, refers to the geological work of Mr. Julian Woods in order to show a curious extension of the volcanic action which is to be "traced in South Australia." On referring to the extract, however, it appears that Mr. Woods' reference is not to South Australia, although it relates to the country close upon its border. Mr. Woods says:—"At about fifty miles east of Mount Gambier, on the Victorian side of the boundary, there commences an immense volcanic district, which may be traced with very little interruption to Geelong by immense masses of trap rock and extinct craters of large dimensions. This kind of country extends considerably to the north of the line, and it is underneath the trap rocks there found at the junction of the Silurian slates and ancient granites that the extensive Australian gold-fields are worked." Another extract is given from Mr. Woods' book, embodying a statement similar to that which has been already quoted from Sir Roderick Murchison, namely, that trap rock and other indications of volcanic eruption are no guide to the presence of gold, unless in the neighbourhood of Silurian rocks.

DISTRIBUTION OF RAILWAYS.

A curious paper has just been submitted to the French Academy of Sciences by M. Lalanne, showing that the apparently fortuitous distribution of railways over the surface of a large country is in reality subject to certain laws, which may be stated as follows:—1. The meshes of a network of railways, as their number increases, tend to assume a triangular form. 2. These triangles have a tendency to form groups of six each round a certain point, which, therefore, is the nucleus of a hexagon. 3. When a pentagon happens to replace the hexagon there generally is a heptagon somewhere which makes up the deficiency, so that the number six really represents the average number of lines starting from each point. 4. There are certain exceptional points, such as the capital of the country, towards which more than six lines converge; in this case the number of lines does not exceed 12. 5. In those districts where the network is still incomplete there are centres from which only three lines diverge instead of six; in that case they make equal angles with each other, thus leaving space for the three remaining lines. This strange regularity, now observable in the networks of France, England, and North America, depends upon a primordial law which Buffon calls the reason of reciprocal obstacles. Rivers, mountains, forests, or even the mere inequality in the productive force of different soils, have contributed towards the formation of these regular meshes. Among the consequences which M. Lalanne deduces from this theory of his there is this—that the distance between two agglomerations of population of the same order and near each other must be an extra multiple of the distance between the two agglomerations of an inferior order. Thus, the average distance between two capitals of departments in France is 87 kilometres; that between two contiguous *chefs-lieux d'arrondissements* is 43½ kilometres; and between two contiguous cantons, 14½ kilometres; so that the distance between two prefectures is equal to twice the distance between two sub-prefectures, six times that between two cantons, and 24 times the average distance between two communes.

SUPPLY OF RAW MATERIAL.

Mr. Baker, inspector of factories, in his first half-yearly report for 1863, calls attention to this subject. The growth of flax appears to be decreasing everywhere whence we have hitherto been supplied; and though an annual knowledge of the acreage sown is as essential to the vitality of the linen trade as where cotton is to come from is to the cotton trade, the growth of flax is exciting no very extraordinary attention. The changes taking place in agriculture and the diminution of cottier farms, which are peculiarly favourable to flax cultivation, owing to the cheapness of home labour, and the facility with which flax can be prepared in the first instance, make the matter more important. In England we have no statistics of flax; in Scotland they have been given up; in Ireland they have been collected for years by Mr. Donelly in a most satisfactory manner—a proof of what might be done elsewhere. So with regard to English wool; we guess that there is a sheep to an acre on all the farm lands in England, but whether it is so or not we are totally in the dark. But for Australia, and, even with Australia, but for rags reduced to wool again, and remanufactured, many of our woollen mills would long ago have been at a standstill; and with regard to flax, if there should be a flax famine, as there has been a cotton famine, we should again suffer extremely, with the consciousness that by a little timely forethought those sufferings might have been alleviated if not averted. A company was started in Yorkshire a few months ago, including some flax millowners, for the purpose of collecting flax in this country from the farmers, and preparing it for the trade, but the company has been broken up for want of encouragement even from the trade itself.

Home Correspondence.

THE BRITISH MUSEUM.

SIR,—The extract from Professor Levi's Annals, in regard to the lighting of the British Museum, inserted in your *Journal*, page 618, affords a melancholy proof that we have not yet arrived at the art of constructing buildings that can be either lighted, warmed, or ventilated without the attendant risk of destruction by fire in various degrees, according to the means adopted for the attainment of those several objects.

Mr. Braidwood, the Superintendent of the London Fire-Engine Brigade Department, is naturally induced, by his daily and nightly avocations, to foresee danger wherever fire, or artificial light in any shape, or even simple hot water tubes for warming, or lighting may be introduced, but allows that the British Museum might be lighted by means of oil-lamps or candles with comparative, but not perfect, safety. I will ask that gentleman how it happens that we seldom, if ever, hear of the explosion of the powder-magazines of our war vessels through their own light rooms, which are in habitual use because the magazines are quite out of reach of daylight.

Mr. Braidwood, of course, takes our buildings as he finds them, either not at all, or very inefficiently ventilated, with the ends of beams and rafters not unfrequently running through the fire-flues, filled with a large amount of highly combustible furniture, and abundance of drapery of the fullest description ready to blaze up at the slightest spark. Is it wonderful that, under such circumstances, that gentleman anticipates danger from fire everywhere?

Mr. Braidwood is further of opinion that illumination by means of gas is highly dangerous, and there is no doubt that it is so, considering the way in which most of our public and private buildings are usually constructed; and he also states that the desiccating power of gas flame is excessive, as well as very injurious in many ways. The first danger is that of explosion, but if all buildings lighted by means of gas were sufficiently ventilated for health and comfort, that is to say, if the air in the room was kept nearly as pure as that outside, all loose gas, from its superior brightness, would escape as fast as it leaked out, and no explosion could ever take place. Besides, Mr. Braidwood entirely ignores the beautiful system introduced more than twenty years ago, by Professor Faraday, in the Royal Institution, a system analogous to that adopted in the light rooms of the magazines, in which neither the gas flame nor any of the products of combustion are in contact with the atmosphere of the room.

Gas light is commonly said to be very injurious to the eyes, but so would twelve mould candles, the equivalent of an ordinary argand burner, when burning at the same distance from the eyes. Again, the desiccating property of gas flame would disappear with the admission of the fresh air required for due ventilation, and more elegantly still by causing a fountain to play during the time that the room is occupied and lighted. The general adoption, however, of Faraday's gas light bell and tube would remove all the inconveniences of artificial illumination, but for health and comfort perfect ventilation will still be indispensable in every case of crowded rooms, and here I may notice a very reprehensible custom very generally prevalent, that the instant the last person has left the room, hall, or church, the custodiers carefully close and lock all the doors, so that the effluvia always emanating from living beings are allowed to settle, and permanently adhere, to the walls.

Mr. Braidwood is perfectly justified in condemning the use of sun-burners, the most wasteful and extravagant mode of gas lighting ever invented, though that adopted in the House of Commons is still worse, the sun-burners having to send their light through a ground-glass ceiling, a depth of fifty or sixty feet down to the floor of the house, and, be it observed, that illuminating power diminishes in the ratio of the squares of the distances, so that a

single well-snuffed mould candle close at hand would afford more light to the reader or writer at the table than that from the distant sun-burner above.

The good and bad principles of warming and ventilating may be readily illustrated by a few familiar examples. The arrangement of warming and ventilation of the Infirmary at Derby, by the late talented engineer, Sylvester, is of a most perfect description, and the atmosphere of the different wards is always pure and wholesome. The supply of fresh air is drawn from a hilltop, several hundred yards distant. In summer the air is cooled, when necessary, by passing through cold water cases, while in winter it is warmed by passing through the hot cockle, and moistened by having to travel through a shower-bath. All the vitiated air passes out into a foul air-shaft, at the level of the cornices, which are perforated throughout for the admission of fresh air, so that that there is no perceptible draft in any of the wards. The air is perfectly pure and sweet, and of course the dust on the floors is never disturbed.

The exhibition rooms of the Royal Academy are, on the contrary, from bad or no ventilation, very offensive on a crowded day, for the fresh air is supposed to be supplied through extensive perforations in the floors of all the rooms, and the consequence is that the whole of the dust and dirt off the shoes of the visitors, together with the rank smell of shoe leather, rises up to the mouth and nostrils, and may be fairly tasted as well as smelt, thus rendering those handsome rooms exceedingly offensive and disgusting.

The House of Commons is, perhaps, in a still worse predicament, having also perforated floors, through which fresh air, so called, is drawn from the level of the Thames and the sewerage by the power of one or more steam-engines. Hence the complaints of honourable members of hot and cold drafts about their legs, and sometimes of intolerable smells of dust, boot leather, and sewage.

The Crystal Palace, at Sydenham, can hardly be said to be ventilated at all, for it is quite a luxury, after the heat and oppression felt inside, to rush out on to the open terrace outside, even when exposed to the bright, burning sun of July; and the attendants, especially in the refreshment departments, earnestly wish that one-half of the glass was knocked out.

I have seen the walls of a crowded court house, with the doors wide open, but unprovided with ventilation, running down with water, produced by the condensation of the aqueous vapour, to such an extent as to cause extended pools of water on the floor.

I cannot say much in favour of the Great Room of the Society of Arts, but having been built in ages gone by, when ventilation and gas-lighting were myths, perfection is not to be expected. When it was formerly lighted with oil-lamps, and three or four hundred persons were assembled therein, tubs and buckets were required to catch the water which poured down from the skylight, the result of the condensation, by the cold glass, of the aqueous vapour, a convincing proof that no preparation for proper ventilation had been made in the original building. Of course that inconvenience is removed by the intense heat of the sun-burner, which, when first lighted, may be felt at the table, but ventilation is as much required now as formerly. When the room is full, as each person is calculated to vitiate forty cubic feet each hour, it would require a change of from twelve to sixteen hundred cubic feet per hour in order to maintain the atmosphere of the room in a healthy and pleasant condition. I am, &c.,

HENRY W. REVELEY.

PRESERVATION OF IRON-PLATED AND OTHER SHIPS.

Sir,—I have read with much pleasure the interesting paper which has appeared in your *Journal* respecting the patent of Mr. Jean Pierre Jouvin, for preserving iron-plated and other vessels, and metallic articles from oxidation, and preventing ships' bottoms from fouling.

My object in addressing these few lines to you is not to discuss this important invention, but to lay before the members of the Society a few facts which I have observed during the last few years, in the course of some researches which Mr. Richard Johnson and I have made on this most interesting subject.

In the year 1858, Mr. Johnson and I took plates of iron, and covered one surface with $\frac{1}{20}$, $\frac{1}{40}$, $\frac{1}{80}$, and $\frac{1}{100}$ of its extent of zinc plate, which we tied close to the iron plates, and then immersed them in soft and sea water. We examined these plates at the end of one, two, and three months, and finding that the zinc had exercised a very remarkable preservative effect upon the iron, we brought the matter under the notice of Mr. Robinson, shipbuilder, at Newcastle, who promised to institute a series of experiments in connection with his iron ships, to ascertain whether the results we had obtained in my laboratory would be confirmed on a practical scale, but this gentleman soon after fell ill, and ultimately died. In the meantime it occurred to us that the most practical mode of applying zinc for the preservation of iron ships would be to use galvanised iron, and we therefore instituted a series of experiments to ascertain the extent to which protection would be thus afforded.

Plates of iron of three inches square were attached with great care to pieces of oak of the same surface, and immersed in soft and sea water. Similar plates of galvanised iron were also similarly attached to pieces of oak and immersed in soft and sea water, and the following were the results observed after two months' immersion, viz., from January 3rd to March 5, 1862:—

		Loss by corrosion.
Pieces of wood and iron	in distilled water...	1·230
		1·230
	in salt water	2·400
		2·380
Pieces of wood and galvanised iron.	in distilled water...	0·100
		0·125
	in salt water	0·095
		0·090

We were anxious to know whether a prolongation of the experiment would continue to show the same comparison, and we therefore again immersed the plates in distilled and sea water until May, 1863, when the iron plates were again removed from the pieces of oak, carefully washed and dried, and weighed.

		Loss by corrosion.
Pieces of wood and iron	in distilled water...	1·700
		1·550
	in salt water	4·320
		4·280
Pieces of wood and galvanised iron.	in distilled water...	0·500
		0·830
	in salt water	0·780
		1·220

These results leave no doubt of the great protective power exercised by zinc against the corrosive action of water, and especially of sea-water upon iron plates. I therefore think that all iron used in shipbuilding should be galvanized, and as this operation is now performed with such facility and so little expense, I cannot see any commercial objection to its general adoption. There is a further argument in favour of this course, in the fact that it is not the loss of iron only that is in question, important as that is, but there is also the wood, which, especially in the case of oak, is rapidly deteriorated by the presence of oxide of iron, upon which the gallic and tannic acids of oak exercise a powerful action, and thus cause the wood to enter into a state of rapid decay, or emaracausis, well known to shipbuilders.

Mr. Johnson and I also deemed it advisable to ascertain whether the zinc was liable to be removed from the surface of iron by intense friction, and to decide this point we made the following experiments:—

Large bolts, one foot long and half an inch in diameter, were driven into solid blocks of oak by a sledge hammer. The blocks were then opened and the bolts were found to be not in the slightest degree uncoated. Another series of experiments was made, consisting of driving screws of the same diameter as the bolts into solid blocks of oak, and the same satisfactory results were obtained.

I am, &c.,

F. CRACE CALVERT.

Manchester Royal Institution, Aug. 12, 1863.

Proceedings of Institutions.

WEDNESBURY MECHANICS' INSTITUTION.—The twenty-fifth annual report states that the total receipts for the year amount to £70 6s. 6d., and the expenditure to £112 4s. 3d., showing an excess of payment over receipts of £41 17s. 9d., being £7 1s. 9d. more than the balance in hand with which the year was commenced, thus leaving the Institution that sum in debt to the treasurer. £25 8s. has been spent in books, being £14 more than the amount paid on that item in the previous year. It having been frequently recommended to the Committee to make a large addition to the library, and new catalogues being required, it was resolved before they were printed to obtain a good supply of books, and about 70 fresh volumes were ordered, and 38 others were procured to replace such as were worn out. In examining the library, it was found necessary to re-bind many of the volumes, and on this item £4 7s. more this year than last has been spent. Add to these the cost of the new catalogues (which by the sale will be gradually returned), new table and forms, a set of chessmen and table which have been placed in the reading-room, and it is soon seen how the balance in the treasurer's hands has gradually been reduced. The balance last year was increased by about £5, owing to the expenses on account of the lectures not having all been paid. This year, however, the Lecture Committee was authorised to make all payments, and to hand in a statement showing at once the profit or loss on the course. Notwithstanding that during the year the Committee has largely added to the library, had classes conducted, and carried on an attractive series of lectures and penny entertainments, hoping thereby to add to the popularity of the Institution, yet they are only enabled to report an increase of 52s. in the amount of subscriptions. As has been the custom now for some years past, the Committee made arrangements for a course of lectures to be delivered during the winter. Previous experience showed that those lectures which were of an entertaining character were the ones by far the best attended, and an endeavour was made as far as possible to provide for the gratification of this taste. This led to a greater expense than has been incurred for engagements for some time. It was resolved, however, to admit the members of the Institution at half price, and efforts were made to prevent, if possible, any loss on the course. The committee, however, have to report a deficiency of 30s. as the financial result. The movement which has been set on foot in many parts of the country to give penny entertainments, consisting of vocal and instrumental music, interspersed with readings and recitations, appearing to have met with great success, and to have been very useful, the committee resolved to start in Wednesbury. A commencement was made on the first Monday of the present year, and the entertainments were continued up to the last Monday in March, and the result has proved that here, as elsewhere, they have become very popular. From the statement presented by the Penny Entertainment Committee, it appears that there is a balance in hand of £4 9s. 1d., with which to commence next winter's course, if deemed desirable. The classes were this season commenced about the middle of October, by a general meeting, at which Mr. Jones attended and explained the Examination scheme of the Society of Arts, and of the District Association, and also gave many useful hints on the best methods to be pursued. Afterwards, about twenty names were given in as students, and these were soon further increased to twenty-five or twenty-six. The following classes have been in operation during the winter:—arithmetic and mathematics; writing; reading and dictation; mechanical drawing; English grammar. The attendance at these classes was very satisfactory up to Christmas, sometimes as many as eighteen being present on the Monday evenings. To those who gave their services as teachers the committee tender their best thanks. After Christmas the penny entertainments had the effect of diminishing the attendance on Monday evenings, and arrangements were made for holding that class on Friday nights, yet the number of students did not increase to what it was at the commencement, the average number not exceeding 8 or 10. A desire having been expressed by some students for instruction in chemistry, arrangements were made with Mr. Jones, and a class was started for the study of that subject, which has been in successful operation during the winter, and continues to be well attended. Sixteen students belong to this class. The Committee look upon the class operations of the past year, on the whole, with considerable satisfaction, and they trust that another season they may not only be able to open the various classes earlier, but may find that they are more numerously attended. The large addition made to the library, as already referred to, has resulted, as might have been expected, in a greatly increased circulation of books, the total number this year being 2,297, against 1,731 of the previous year, showing an increase of 566. The Committee have to announce the retirement of Mr. Samson Lloyd from the secretaryship of the Institution, after having been connected with it from the commencement; but they cannot allow the occasion to pass without recording their sense of the value of the services he has rendered to the Instiution, and that when it has been in difficulties—and it often has—he and the late lamented treasurer very liberally assisted to clear off the debt, and again start the Committee free from such an incubus.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August 7th*, 1863.]

Dated 27th May, 1863.

1328. A. P. Hernandez and P. B. Crespy, Bordeaux—Imp. in the manufacture of soap.

Dated 22nd June, 1863.

1562. E. Wilks, Cheltenham—Imp. in making portmanteaus and trunks of various shapes and sizes, light, strong, airtight, and watertight, capable of bearing immersion in water without injuring the contents.

1565. W. Snell, 16, Clement's-inn, Strand—Imp. in arrow-shaped projectiles, and in guns for discharging the same. (A com.)

Dated 24th June, 1863.

1591. P. R. Hodge, 25, Cannon-street—Improved floating hydrostatic machinery adapted to presses, dry docks, slips, or the moving or lifting of heavy masses, parts of which are applicable to the expressing of oil or other fluids.

1593. S. Smith, 5, Fell-street - Imp. in the manufacture of liquorice, and in the means or apparatus employed therein.

Dated 29th June, 1863.

1619. G. Davies, I, Searle-street, Lincoln's-inn—An improved cork cutting machine. (A com.)

Dated 2nd July, 1863.

1651. J. King, Chadshunt Farm, near Kineton, Warwickshire—Imp. in fencing land and in hanging gates.

Dated 4th July, 1863.

1664. R. Flude and J. Farndon, Aylestone-street, Leicester—Imp. in looms for weaving narrow fabrics.

Dated 6th July, 1863.

1675. T. W. Coulderry, Old Kent-road—Improved means of attaching boxes or receptacles to hold soap, black lead, or similar household articles to the sides of wash tubs, pails, or house boxes.

1677. S. J. Cooke, 2, St. Michael's House, Cornhill—Imp. in apparatus for supplying carbonic acid gas to casks or other vessels containing beer or other fermented liquid. (A com.)
1679. B. Bonfield, Forest-hill, Kent—Imp. in stoppers for bottles.

Dated 7th July, 1863.

1682. L. J. Guichard and G. G. J. Lefebvre, 10, Rue de la Fidelité Paris—Imp. in lamps, and in the wicks used in such lamps.
1683. W. S. Bruce, Great St. Helen's, Bishopsgate-street—Imp. in lucifer matches, fusees, and other similar lights, and in the boxes or holders for containing the same. (A com.)
1685. G. Bartholomew, Linlithgow, N.B.—Imp. in shoes for the feet of horses and other animals, and in the means of connecting them.
1689. S. Robinson, 129, Great Brunswick-street, Dublin—Imp. in spring hinges for swing doors.

Dated 8th July, 1863.

1691. E. Myers, 2, Millbank-row, and H. Forbes, 6, Aberdeen-place, Maida-hill—An improved method of propelling and steering ships.
1693. W. Bashford, Pewsey, Wiltshire—Imp. in apparatus for generating and purifying gas made from coal or other bituminous substances.
1697. P. A. L. de Fontainemoreau, 4, South-street, Finsbury—A new mode of roofing houses, buildings, and other structures. (A com.)
1699. A. G. Southby, Bradford—Imp. in diverse lamps.
1703. H. D. P. Cunningham, Bury—Imp. in working guns, and in matters relating thereto.

Dated 9th July, 1863.

1705. S. Davis, 33, Strand—An improved anatomical bit for horses or other animals. (A com.)
1706. J. Smith, Berkeley-house, Seaforth, near Liverpool, and S. A. Chease, Egremont, Cheshire—A new description of hydraulic engine for raising water and other fluids above their common level, the fluids so raised to be used as a motive power.
1707. W. Williams, Gutter-lane, Cheapside—Imp. in shirt collars and boys' and ladies' collars.
1709. R. A. Brooman, 166, Fleet-street—Imp. in ships, and in propelling the same. (A com.)
1711. J. F. Delany and J. C. R. Okes, Victoria Foundry, Greenwich —Imp. in the pistons of steam engines.
1715. W. E. Newton, 66, Chancery-lane—Imp. in barometers or gauges for measuring the pressure of fluids. (A com.)
1717. G. Gowland, Liverpool—Imp. in the construction and arrangement of nautical and surveying instruments for measuring angles and altitudes.

Dated 10th July, 1863.

1719. P. A. Godefroy, 7, Shepherd's-lane, Homerton, Middlesex—Imp. in the mode of purifying oils.
1721. M. A. F. Mennons, Abingdon-chambers, Westminster—Imp. in the mode of preserving and protecting the silvering of mirrors. (A com.)
1723. C. De Bergue, Manchester—Imp. in piles for foundations, and in piers for bridges and other buildings or structures.
1727. W. E. Jones, 22, Wellington-road, Clapham, Surrey—Imp. in the permanent way of railways.
1729. J. P. Bourquin, Newman street, Oxford street—An improved construction of rolling press.
1731. R. Hawthorn and W. Hawthorn, Newcastle-upon-Tyne—Imp. in the working of railways.

Dated 11th July, 1863.

1733. E. D. Chattaway, New Broad-street—Imp. in railway signals.
1737. J. Barnes, Nottingham—A new machine for clipping off connecting threads in the manufacture of lace.

Dated 13th July, 1863.

1741. R. D. Dwyer, Warrington, Lancashire—Imp. in the construction of vents for casks and other vessels.
1745. J. Barton, Alfreton, Derby—An improved guard or fence for coal, iron, stone or other pits, warehouse or other lifts, sack holes, or other places requiring a guard or fence.
1747. G. H. Barber, Southampton—An improved calendar or date-denoting apparatus.
1748. J. Laing, 80, George-street, Manchester—Imp. in dyeing or printing. (A com.)
1751. P. C. A. Idocius, Dunkerque, France—Imp. in fishing, and in the apparatus or means to be employed therein. (A com.)

Dated 14th July, 1863.

1753. L. M. Bouruique and J. B. Vidard, Paris—Certain imp. in railway carriages.
1754. J. M. Bouruique and J. B. Vidard, Paris—An improved waggon or truck to be used on railways.
1755. J. R. Cooper, Birmingham—Imp. in sights for rifles and other fire arms.
1757. J. T. Cooke, Leicester—Imp. in and connected with battens for driving shuttles from side to side of their work in weaving.
1759. G. Saxon, Openshaw, Lancashire—Imp. in metallic pistons.
1761. R. Hornsby and J. E. Phillips, Grantham, Lincolnshire—Imp. in reaping and mowing machines.
1763. E. Sonstadt, Loughborough, Lincolnshire—Imp. in the manufacture of sodium.

Dated 15th July, 1863.

1767. E. Funnell, Brighton—A self-acting electro magnetic clock-work signal for railway purposes.
1771. W. Clark, 53, Chancery-lane—An improved process for making paper transparent and transferring designs. (A com.)
1773. M. Henry, 84, Fleet-street—Imp. in figuring, ornamenting, and colouring fulled and felted fabrics and articles. (A com.)
1775. R. A. Brooman, 166, Fleet-street—Imp. in apparatus for telegraphing by electricity. (A com.)
1777. D. Tamet, 103, Vieille Route à Neuilly sur Seine, France—Imp. in breakwaters and in the construction of rail and other ways thereon.

Dated 16th July, 1863.

1779. A. Watson, Glasgow—Imp. in cooking ranges.
1781. J. N. Taylor, Brixton, and W. Austin, Mitford, South Wales —Imp. in the construction of ships and other floating bodies.
1783. L. Priestley, Bradford, and J. L. Todd, Morley, Yorkshire—Imp. in the manufacture of elastic boots and shoes, and in apparatus used therefor.
1789. B. Lambert, 35, Lothian-road, Camberwell New-road—Imp. in the preparation of waste paper in order to its being again used in the manufacture of paper.
1791. N. Thompson, 15, Abbey-gardens, St. John's-wood—Imp. in boat building, and in machinery for shaping wood therefor.

Dated 17th July, 1863.

1793. A. J. Sedley, 210, Regent street—Imp. in the canopies of bedsteads of metal or wood, or both combined, and other articles of furniture used to sit or recline upon.
1796. F. Lepoutre, Tourcoing, France—A new mechanical sector, applicable to all self-acting machinery used for spinning textile fabrics.
1797. T. Johnson, Hadleigh, Suffolk—Imp. in machinery for washing and cleansing casks.
1799. R. A. Brooman, 166, Fleet-street—An improved varnish for preserving metal and wood. (A com.)
1801. R. Coenen, 19, Old Broad-street—Imp. in machinery for winding, measuring, and sizing silk. (A com.)

Patents Sealed.

[*From Gazette, August 11th*, 1863.]

10th August.
388. J. Jones.
392. W. Robertson.
393. G. Wrigley and S. Morris.
394. O. H. Hodge.
401. J. S. Gisborne and W. Simpson.
410. J. Higgins and H. Higgins.
415. J. W. Crossley.
416. C. D. Abel.
420. R. A. Brooman.
423. S. W. Clough.
424. W. Nalder.
426. T. W. Salmon.
513. G. Bower & W. Hollinshead.
528. T. V. Lee.
561. J. H. Johnson.
708. W. E. Newton.
808. B. W. Goode.
903. G. Low.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, August 11th*, 1863.]

3rd August.
1889. R. Bodmer.
4th August.
2086. G. Kershaw.
2088. R. Perrott, jun., and J. Molony.
5th August.
1908. R. A. Brooman.
1923. M. Dodds.
1945. R. Smith.
2052. E. T. Truman.
7th August.
1926. G. H. Newton and A. Wild.
1965. N. Wehnert.
2015. E. Hall.
2055. R. Jobson and R. J. Ransome.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, August 11th*, 1863.]

3rd August.
1840. H. W. Wood,
4th August.
1854. J. Y. Borland.
6th August.
1876. T. Whittaker.
2006. B. A. Grautoff and C. H. W. Albrecht.
8th August.
1885. J. Cartland.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4574	July 29.	Steam Engine Standard	Benjamin Miller	Providence-street, Leeds.
4575	Aug. 6.	Improved Steam Trap or Condense Syphon Box	William Oxley	Manchester.
4576	„ 7.	Cartridge Case	Wm. Barry Lord	Sandgate, Kent.

Journal of the Society of Arts.

FRIDAY, AUGUST 21, 1863.

SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

NOTICE TO MEMBERS.

In accordance with the Report adopted at the General Meeting held on the 17th ult., additional subscriptions for carrying out the Society's Memorial of His Royal Highness the Prince Consort are invited.

Any member desiring to subscribe, or to increase the amount of his subscription, is requested to send a Cheque or Post-office Order, made payable to Mr. Samuel Thomas Davenport, the Financial Officer.

NOTICE TO INSTITUTIONS.

The Programme for the Examinations for 1864 is now ready, and may be had *gratis*, on application to the Secretary of the Society of Arts.

PETROLEUM OIL.

Within the past three years a vast and rapidly-increasing traffic has sprung up in a mineral product whose existence, though long known, had excited little previous attention,—the rock or petroleum oil. Efforts had been made since 1846—and with moderate success—to supply an oil for illuminating and lubricating purposes distilled from the softer, or, as they were usually called, the fatty coals. The English cannel coals, the Nova Scotia cannel, the Breckenridge, and some other of the bituminous coals of the western slope of the Apalachian range, produced these oils in considerable quantity. The oils—or rather hydrocarbons—thus distilled were less dense than ordinary animal or vegetable oils, but exhaled a peculiar and somewhat unpleasant odour, and burned with abundant smoke, requiring a peculiarly-constructed lamp to consume the excess of carbon. In 1859 there began to be a considerable production of oil from the petroleum wells or pools which had been known to exist in Venango county, Pennsylvania, and its vicinity for more than a century, and from some new ones opened in August of that year at Titusville by Messrs. Bowditch and Drake, and the question of the probability of combining this oil with that distilled from the coal, or of using it alone, after refining, as an illuminating oil, began to be discussed. After careful investigation and experiment, it was demonstrated that, though possessing less body than the coal-oil, it could be used with satisfactory results for illuminating purposes. But there was still a difficulty. Could a uniform and sufficient supply be procured, or were the wells and pools as yet opened merely limited deposits, liable to be soon exhausted? This question, which need not have occasioned any anxiety, had the history of petroleum deposits been more generally known, was solved in August 1861, by the discovery—the result of deeper boring—of spontaneous flowing wells, which threw up vast quantities of the oil,—more, indeed, than could be saved at first, with the scanty supply of tanks, vessels, barrels, &c., which had been required by the pumping wells which up to that time had been the only source of supply. An intense excitement followed in the oil-region of Pennsylvania, which lay mainly along the valley of Oil Creek and its tributaries in Venango, Warren, and Crawford counties. Three thousand barrels of oil a day were obtained from a single well, and in every direction new borings were going on, and new discoveries of flowing wells were made almost daily; while other regions of similar geological structure were carefully explored for evidence of their capacity for producing oil. Soon there were oil-wells,—either pumping or flowing,—yielding considerable quantities, in Western Virginia, Kentucky, Ohio, and Canada; and more recently discoveries have been made of the existence of petroleum in large quantities in California and in some of the North-western States. At first vast quantities of the oil were wasted; but latterly the flowing wells have been fitted with strong tubing and stop-cocks, so that the supply is entirely under control.

The quantity sent to market from the Pennsylvania wells in 1859 did not exceed 20,000 gallons, of which 13,000 gallons went over the Sunbury and Erie road. In 1860 the number of pumping wells had increased till, at the close of the year, there were nearly 2,000: of these, however, only 74 yielded any considerable quantity. The daily yield of these was about 1,165 barrels, or 46,600 gallons, and as the price of the crude oil was then 20 cents per gallon, this amount was worth about 9,320 dollars. The total quantity sent to market in 1860 was but little over 2,000,000 gallons. In 1861 the production increased greatly, especially after the discovery of the flowing wells. Not less than 20,000,000 gallons were sent to market, and large quantities retained in the oil-region. Meantime, a considerable export demand for the oil had sprung up in Great Britain, France, Belgium, Germany, South America, and the West Indies. The entire exports of the year—including those to California—were probably not far from 2,500,000 gallons.

In 1862 the traffic met with a still more rapid development. The foreign demand, at first dull, gradually increased, and Liverpool became the great foreign market of the trade, though considerable quantities were shipped to other ports. Nearly 3,000,000 gallons was sent to that port alone, and about 5,000,000 to all the British ports. The exports from the principal ports to foreign countries were as follows:—

				Dollars.
New York ...	6,783,563	gallons,	valued at	20,37,413
Philadelphia ...	2,607,203	,,	,,	529,575
Boston	891,616	,,	,,	457,859
Baltimore ...	1,120,000	,,	,,	500,000
Total ...	11,402,382	,,	,,	3,524,847

The invoices of these shipments are undoubtedly too low, as Mr. Macrae, a leading Liverpool oil-broker, on the 18th October, 1862, estimated, from data in his possession, the receipts of petroleum oils in Great Britain alone from the United States and Canada during the year at over one million pounds sterling (5,000,000 dollars). The amount sent to California was large, but is not readily ascertainable. Nor is it practicable to ascertain the entire production, scattered as it was over so extended a region and sent to market by so many routes. If it bore the same proportion to the foreign export as that of the previous year, it must have approached to 100,000,000 gallons; but this is hardly probable. The daily yield from the wells of the Oil Creek region was stated by the "Oil City Register" as 5,717 barrels a day, which would be equivalent to an annual product of about 71,000,000 gallons. A railroad has been constructed 27 miles in length, from Titusville to Corry, at the junction of the Atlantic and Great Western Railway and the Philadelphia and Erie Railroad, for the transportation of the oil, and its freightage is already very heavy. Large quantities are also sent in barges down Oil Creek and the Alle-

ghany river to Pittsburg, which has been the most important point for refining the oil, though now immense quantities are refined in the vicinity of New York, Philadelphia, Boston, Baltimore, and Cincinnati.

The existence of petroleum springs, pools, and lakes has been long known, and the bitumen and naphtha produced by them have been in use for various purposes for centuries. On the island of Zakanthus, now Zante, there were wells of petroleum in the time of Herodotus, 500 years before Christ, which were minutely described by him, and are still in existence and yield bitumen. Near Ecbatana, in Persia, was a petroleum lake, which Plutarch describes as having been on fire in his time. The perpetual fires of Baku, on a promontory of the Caspian Sea, which have been an object of such devout care among the Parsees for so many centuries, are fed from petroleum springs. In China, in Thibet, and especially in Burmah, near the Irrawadi, are extensive wells or pools of petroleum or naphtha, whose products have afforded a commodity for trade, to a limited extent, for centuries. The Dead Sea, in Palestine, has numerous petroleum springs on its banks, and the bitumen floats upon its waters. In Italy there are several springs of naphtha. In the island of Trinidad there is an extensive lake covered with the products of the hydro-carbons, and known as the Great Pitch Lake,—very fully described, in 1855, in the "American Journal of Science," by the late Dr. N. S. Manross, who had visited and explored it; and in Jamaica there are several pools of the same substance. The region near the head-waters of the Genesee river, and along Oil Creek, in Pennsylvania, has long been known as producing this mineral oil, which was used by the Indians in their religious ceremonies and also as a medicament for wounds. Under the name of Seneca oil, or Genesse oil, it has been sold for nearly a century, put up in small bottles, as a remedy for bruises, sprains, &c. The region along the south-east shore of Lake Erie has undoubtedly extensive lakes of it at some distance below the surface. At Fredonia, in Chautauqua county, New York, many years ago, bubbles of inflammable gas were observed ascending from the mud at the shore of the lake, and the inhabitants constructed a gasometer, collected the gas which ascended, and utilized it for lighting the streets of their village. Yet, while so widely diffused and so generally known, the idea of its adoption as a substitute for oil in illumination seems not to have been practically acted upon before 1859.

Opinions are divided as to the origin of petroleum. It was at first regarded by geologists as wholly a product of vegetable carbonisation; and it was alleged that the marine vegetation of some portions of the carboniferous era was so rich in hydro-carbons that, under the pressure of the superimposed strata, the oil or petroleum was expressed from them, and flowed into reservoirs in the limestone strata of the coal measures; but it has been found of late that the oil, though sometimes found in the cavities of the limestone rocks of the carboniferous period, is also sometimes found above or below them; and the impression is gaining ground that it may have had its origin in the destruction and decomposition of animals as well as vegetables.

The fluctuations in the price of the oil during the year 1862 were extraordinary. In New York and Philadelphia, at the commencement of the year, the crude oil was sold at 22½ to 24 cents a gallon; in May, June, and July, it had fallen to 9, 10, and 11 cents; November 1, it had risen to 18 to 23 cents, and on the 29th of the same month was sold in Philadelphia at 40 and in New York at 55 cents the gallon: while at the close of the year it had fallen again to 25 cents. The fluctuations in the refined oil were equally remarkable. In January, 1862, it brought 40 to 47½ cents, in April, May, and June, 19 to 25 cents, in October, 35 to 50 cents, in November, 95 cents to 1·10 dollar, and in December had fallen to 40 cents.

"The *Times* of the 7th of August, 1863, says:—"The trade in petroleum oil from America continues to increase at the rate which was predicted soon after its discovery. In the first half of the year 1861 the exportation from New York, &c., was 3,250 barrels; in the same period of 1862 it was 108,000; and in the same period of 1863 it has been 425,000 barrels. A preparation of the material which is called colzarine oil, and which is free from smell and also from sulphur compounds, has lately enabled it to be used in the moderator lamp."

The following paper, on "The Oil Wells of Canada," was read before the Canadian Institute by Mr. Sandford Fleming, C.E.

During a recent visit to the village of Oil Springs, in the township of Enniskillen, I made the following notes on the present condition of the oil wells in that quarter:—

The first flowing well discovered was that known as the "Shaw Well," on Lot 13 in the Second Concession. The oil was "struck" in the early part of last year, and continued to flow spontaneously for about ten months. This well was formed by digging about fifty feet through clay to the rock surface, and then by boring one hundred and fifty-eight feet through the latter. The flow from this well has now entirely ceased, after discharging a total estimated quantity of 35,000 barrels.

During the past year, or at least since the first discovery of the Shaw Well, there have been found in all about thirty flowing wells of more or less value in this section.

The yield of all these wells, as I was informed, was at one time as much as 12,000 barrels per day. They are all situated within an area of one square mile, and chiefly on the south bank of the Black Creek, only one having been discovered to the north of it. The number of flowing wells is now reduced to two, an old and a new one recently opened. These two wells are within a hundred feet of each other, and yield, it is said, over one hundred barrels per day each. Many of the old surface wells are now brought into requisition, and such of the old flowing wells as yet afford oil by pumping are worked by hand. The total yield from the flowing wells and all other sources at the present time is said to be about four hundred barrels per day.

There is one remarkable peculiarity connected with the stoppage of the natural discharge of oil from the wells, which might here be mentioned. The deepest wells invariably have been those which first ceased to flow, and the two shallowest of all the thirty wells are those only which now yield a natural discharge of oil.

I ascertained the depth of nine separate flowing wells, at points scattered over the whole oil-producing area, to be as follows:—

The deepest well......	G	is 230	feet in the rock.	
,, next deepest	I	is 208	,,	,,
,, ,, ...	B	is 200	,,	,,
,, ,, ...	C	is 182	,,	,,
,, ,, ...	H	is 180	,,	,,
,, ,, ...	D	is 162	,,	,,
,, ,, ...	A	is 158	,,	,,
The shallowest wells	E	is 109	At present flowing	
	F	is 109		

It ought to be borne in mind that I give the depths under the rock surface, not under the surface of the ground, the former being nearly level, while the latter is very uneven. Over the surface of the rock, the thickness of clay ranges from forty feet in the flats of the creek to eighty feet on the banks.

The deepest well (G) was the first to fail; in fact, this one only discharged 4,000 barrels in all. The next on the list (I), the "Feroe" well, failed. Then the wells (B and C) at opposite extremities of the oil-producing area gave way. Then well (H), in the centre, and close by the gum beds, ceased flowing. Then various intermediate wells failed, until now the only old well flowing is F, with a depth of one hundred and nine feet under the rock surface, and its companion (E), recently

made, within thirty or forty yards of it, and to the same depth in the rock, yields a copious supply.

In ceasing to give a discharge of oil, these wells seem to give no previous indications of a coming change. The iron pipe which conveys the fluid from the bore in the rock to a convenient height above the surface of the ground continues to yield a discharge, but this discharge is suddenly changed, in most instances from petroleum to salt water, and the water flows on in a continuous stream, as did the former substance.

The mention of some apparent anomalies may be of interest to those who desire to form satisfactory theories regarding the various phenomena connected with the mineral oils.

1. In the immediate neighbourhood of all the flowing wells, and on the next lot to what is termed the gum-beds, the rock was bored to a depth of three hundred feet—seventy feet lower than the lowest well—without finding the slightest trace of oil.

2. About twenty yards from the flowing well marked I, a second bore was made in the rock to a greater depth by seven feet than the first well, without finding oil.

3. In another case the rock was bored about fifty feet from a good flowing well, and twenty-five feet deeper, without success.

4. But perhaps the most singular case is the following:—Some time after the "Shaw" well flowed so successfully, a second party bored the rock to the same depth about 100 yards from it, and found a copious discharge of oil, but this second well had the immediate effect of reducing very materially the flow from the "Shaw" well. When either was plugged up, the other yielded a full discharge; but when both were allowed to flow, each yielded only a partial supply. A third party, owning a small oil lot between the two wells, commenced boring on a line drawn from the one to the other at the distance of about thirty yards from the "Shaw" well; he naturally expected to rob both wells, whilst their owners (who by this time had formed a co-partnership) had every reason to fear his certain success. All parties, however, were doomed to disappointment, as the third well proved an utter failure, although the rock was bored to a much greater depth than the other two wells.

I may mention that although traces of petroleum have been found at several places beyond the immediate neighbourhood of the village of Oil Springs, viz., at Bothwell, at Tilsonburgh, and at other points within a circle of perhaps ten or fifteen miles, yet, with one exception, I believe no flowing well has been struck beyond a very limited area. The exception referred to is at Petrolea, on lot 14 in 18th concession, Enniskillen, and about six miles from Oil Springs villages. The rock is here bored to a depth of three hundred feet—five hundred and sixty-three feet under the surface of the ground—and a constant stream of salt water and oil is discharged, equal to, it is estimated, 1,200 barrels per day; and of this yield about one per cent, or 12 barrels per day, is found to be petroleum.

There are at the present time a great number of refineries in the neighbourhood of the springs. I had no means of ascertaining the exact number, but I was told that, reckoning large and small, they could not number much fewer than one hundred. The capacity of these refineries is estimated to be equal to 1,500 barrels of crude oil per day, whilst the total yield of the springs is said to be not much more than four hundred barrels.

The "oil-men," although discouraged, are not without hope. They think that, as in Pennsylvania, an increased supply of petroleum will be found by sinking wells to a greater depth, and, accordingly, they are making arrangements, if they have not already commenced, to sink a test well to the great depth of one thousand feet under the surface.

I was informed that, although only about 150,000 barrels of petroleum have been shipped, a total quantity of 300,000 barrels must have been discharged, up to this date, from all the wells, about half of the total yield having been allowed to run to waste. To give some idea of the capacity of the hidden reservoirs in which the petroleum has been stored, I may mention that 300,000 barrels are equal to nearly 2,000,000 cubic feet, and that if brought into one place, the crude oil discharged from the wells of Enniskillen would be sufficient to cover an area of five acres of land to a depth of ten feet.

FRAUDULENT ASSUMPTION OF EXHIBITION AWARDS.

The following report has been issued by the Committee appointed at the meeting held on the 18th day of June at the Society's House:—

A meeting of gentlemen, to whom prize medals and certificates of honourable mention were awarded by the Commissioners of the Exhibition of 1862, was held at the rooms of the Society of Arts (by the kind permission of the Council of that body), on the 18th of June last, when a Committee was appointed for the purpose of obtaining protection for the prize medallists against the unauthorised assumption of the medals and honourable mentions by persons to whom they had not been granted.

The meeting was called in consequence of a recent case, in which an application was made to the Court of Chancery for an injunction to restrain the piracy of the prize medals by a manufacturer who had not obtained any prize medal, nor exhibited at the Exhibition, but which application had failed, the Vice-Chancellor having decided that, by the existing law, the grant of a prize medal to one manufacturer or exhibitor created no right on his part to restrain any statement (fraudulent or otherwise) by another manufacturer of a similar article, to the effect that he had obtained a medal.

The Committee, after conferring with some members of the Society of Arts, obtained the necessary professional assistance, and caused a Bill to be prepared for the purpose of giving effect to the views of the meeting by whom they were appointed. This Bill was drawn with the utmost possible care, with the assistance of gentlemen who had been professionally connected with the "Merchandise Marks Act" of last year, and was settled by two counsel who have made the Trade Marks and Copyright Acts a special study, and who are the authors of the most recent legal works on those subjects; and was afterwards submitted to the consideration and correction of a learned judge, who most kindly afforded to your Committee the benefit of his great experience.

The Draft Bill so prepared was laid before the President of the Board of Trade, who, while expressing his desire to assist in promoting the object in view, hesitated to introduce any measure of the description contemplated into the House of Commons at so late a period of the session.

It became necessary to apply to the Earl of Granville for aid in this difficulty. Some discussion took place, and very earnest representations were made to his lordship of the great importance of the question involved, and the absolute necessity, if any benefit at all were to be derived from any legislative enactment, that the requisite measure should be passed in the session which has just terminated. Earl Granville received the representatives with the utmost kindness and urbanity, and expressed his desire to assist the Committee in the objects they had in view; but, after a consultation with some other members of the Government, a doubt was expressed whether the Bill, as prepared by the Committee, was not likely to lead to a too lengthened discussion for so late a period of the session.

The result was that a gentleman, officially connected with one of the Departments of the Government, was instructed to prepare a short Government Bill, in lieu of that prepared by the Committee, who were, however, consulted, and through their legal advisers made various

suggestions on that Bill, as at first framed. Some of these were adopted; as respects others, the Committee were less fortunate.

The measure as introduced may have been deemed imperfect, but it was apparent that the Committee's clearest possible duty was to aid, by every means in their power, the passing of that measure, even if needing amendment in a future session, rather than allow Parliament to dissolve and the recess to pass without any legislative enactment being obtained, the result of which would have been that, before Parliament re-assembled, the continued piracies of Exhibition awards would have deprived them of value in the hands of the real holders.

The measure so introduced has, with some trifling alterations, become law. The Committee feel confident that the evils complained of will be thereby checked, and that the holders of the awards have the strongest grounds for congratulation.

The measure was introduced, and read a first time, on the 20th July;—read a second time, and Committee dispensed with, on the 21st;—amended, read a third time, and passed in the Lords,—reprinted and introduced in the Commons, and read a first time there, on the 23rd:—read a second time, passed through Committee, and reported, on the 24th;—read a third time and passed, after a long debate, on the 27th;—and received the Royal assent on the 28th, under the title, "The Exhibition Medals Act, 1863."*

This result was only arrived at by dint of very great exertion on the part of those who took any active part, either in the proceedings of the Committee or the carriage of the measure.

The Marquis of Clanricarde kindly undertook, at the shortest possible notice, to take charge of the Bill in the House of Lords, and by his clear and admirable statement of the objects and necessity for the measure, secured its unanimous adoption by that House.

A very large number of members, on both sides of the House of Commons, gave their aid towards the passing of the measure, and the thanks of the medal holders are most justly their due. It is difficult to distinguish where so many are entitled to acknowledgments, but it will probably be felt by all that the President of the Board of Trade, who took charge of the measure in the House of Commons, has added another to the many grounds on which he was already entitled to the thanks of the mercantile community.

The Committee applied to, and obtained the aid of, "The Mercantile Law Amendment Society," and through them the concurrence of the various Chambers of Commerce in the kingdom, and it is in a main degree to the great influence and established position of utility of the Mercantile Law Amendment Society that the success attained may be attributed.

It cannot but be felt that every medal holder will derive benefit from the Act that has been obtained, and that the commercial value of the awards of the Commissioners of the Exhibition of 1851 and 1862, both at home and abroad, has been greatly enhanced by the legislative protection secured.

Of course, the obtaining of an important Act (especially when carried through the legislature with such unexampled speed as in the present case), must be attended with considerable expense. It was necessary, to attain success, that individual members of the Committee should take upon themselves, not only more than their proportion of the labour, but the whole responsibility for the expenses incurred, and the Committee confidently rely on those who have received awards for subscriptions to defray the cost thus incurred in their service.

It is not proposed that the foreign exhibitors should be asked to contribute at all. It is to the defect of the English law, as it existed at the time the Exhibitions were held, that the evils complained of have been attributable. This is a circumstance as to which the English exhibitors might have informed themselves, but for which the foreign exhibitors must have been wholly unprepared, and they cannot properly be asked to aid towards the necessary amendment of a law to which they are strangers.

A large number of the medal holders have expressed their strong feeling of the importance of the present Committee continuing organised for a time, to protect the interests of their fellow medallists, and probably to promote an Amendment Act in the coming session, or to watch the Amendment Bill which the President of the Board of Trade has promised to introduce. The Committee are unwilling to abandon the cause which they have once embraced, and have consented to continue their functions.

The Committee request information of every case that may come to the knowledge of any medal holder, in which any person falsely represents that he has obtained either a medal or honourable mention, and any suggestion as to measures to be adopted towards giving effect to the Act already obtained, and stopping the fraudulent dealings to which it is intended to apply.

Except in so far as any such further proceedings may be concerned, the Committee's task has been performed. They have obtained the legislative protection which they were desired to seek, and they trust it will be felt by the whole of those whose interests were confided to their care, not alone that every exertion has been used for obtaining the result desired, but that there is every ground for mutual congratulations, between the Committee and their constituents, on the unexampled rapidity with which this result has been arrived at, and the success with which their exertions have been crowned.

(By order) EDMUND JOHNSON, *Hon. Sec.*
August 15th, 1863.

* The Act referred to has already been published in the *Journal*, see page 615 of the present volume.

HIGH TEMPERATURE OF THE SEASON.

The Abbé Moigno, in *Les Mondes*, of the 13th instant, speaking of the temperature of Paris, says that Sunday, the 9th of August, was one of the hottest days known for many years. The heat was stifling in the streets, with little or no circulation of air. The pavement actually burned the feet, and the asphalte almost melted under the direct rays of the sun. The leaves of the chesnut trees in the avenue leading to the Observatory looked as if they had been burnt, and in some cases had entirely disappeared from the trees. In a garden in the Rue Notre Dame des Champs, though enclosed, but far from the house, the thermometer in the shade, and distant from the wall, showed, at 2.30 p.m., 39½ degrees centigrade (103 Fahrenheit), and at 4.30 p.m., 36 degrees centigrade (96·8 Fahr.).

It has rarely happened that the heat of Paris has exceeded 36 deg. centigrade. Since the commencement of the present century, it has only once reached as high as 37·2 deg. centigrade, namely, on the 18th of August, 1842. In the previous century higher temperatures than this have been observed, as recorded in the tables prepared for M. Arago. The thermometer was then, however, differently placed from what has been the plan adopted for the last 60 years. The highest temperatures recorded in these tables are 39 deg. centigrade, 19th of August, 1763; 39·4 deg. centigrade, 14th August, 1773; 40 deg. centigrade (104 deg. Fahr.) the 26th of August, 1765. Thus it appears that for 158 years the temperature of the present year has been exceeded but once. The temperature of the 9th of August, as recorded at the Paris Observatory, was 36 deg. centigrade (96·8 deg. Fahr.).

In England, it appears from the Registrar-General's report for the week ending Saturday, the 15th inst., at the Royal Observatory, Greenwich, the mean temperature of the air in the week was 65·1 deg., which is 3·5 deg. above the average of the same week in 43 years. The mean daily temperature was above the average on every

day except Friday. The highest day temperature was 84·9 deg., and occured on Sunday (9th). The lowest night temperature was 50·1 deg., and occurred on Wednesday. The range of temperature in the week was, therefore, 34·8 deg. The mean daily range was 24·3 deg. The difference between the mean dew-point temperature and air temperature was 10 deg.

NEW KIND OF COTTON.

It is stated that cotton has been found in Cuba growing on a vine, which runs along and covers the ground. It is not very fine, but white and strong. As in the very hottest seasons there are heavy dews in Jamaica, it has been supposed that this kind of cotton is likely to succeed on the lands on which the Sea Island cottons will not thrive. A very small quantity was tried in various parts of Jamaica, and some at the reformatory near Kingston. Through the attention of Earl Russell and the Foreign-office, the Jamaica Cotton Company are likely to obtain a considerable quantity of the seed, as will appear from the following letters:—

Foreign-office, July 31st, 1863.

SIR,—With reference to my letter of the 2nd ult., I am directed by Earl Russell to transmit to you herewith a copy of a despatch which has been received from her Majesty's Acting Consul-General at Havana, reporting the steps he had taken to procure and to forward to Jamaica the cotton seed for which an application was made by the Jamaica Cotton Company on the 1st June.—I am, sir, your obedient and humble servant,

(Signed) JAMES MURRAY.

S. Bourne, Esq., 55, Charing-cross.

Havana, July 1st, 1863.

MY LORD,—Immediately upon the receipt of your lordship's despatch, No. 9, of the 1st ult., I set about procuring the 100 lbs. weight of cotton seed of the particular species, a specimen of which was enclosed by the Jamaica Cotton Company; but I regret to inform your lordship that owing to the difficulty of obtaining that quantity, I fear that I shall not receive it from the country in time for transmission by the intercolonial mail steamer leaving this on the 7th inst., *via* St. Thomas, for Jamaica, which is the only means of communication between the two places. The seed will consequently be forwarded by the August packet to the Rev. Mr. Bourne.

The demand for cotton seed is very great here in Cuba; it is extremely difficult to obtain any owing to the blockade of the Confederate ports. If the Cotton Supply Association of Manchester would send me some tons of good cotton seed, it would be a great boon to the enterprising planters here; for I am happy to report to your lordship that the prejudice against the cultivation of that great staple in this island is being gradually overcome by the fine results which have been obtained by those who have tried it. I receive constant application for seed.

I am not prepared to make the report which is ordered relative to the quantity of cotton grown in Cuba, but I shall do so as soon as I am in possession of the data which I am collecting on the subject.—I have, &c., (Signed)

G. V. CRAWFORD.

DESTRUCTION AMONG SILKWORMS.

The authorities in the department of the Isère have announced that a premium of 40,000 francs is to be given to the author of an efficacious remedy against the disease which has caused so much destruction among silkworms in late years. In order to obtain the prize the candidate must prove that his remedy has proved efficacious during three consecutive years. Experiments are to be tried with the proposed remedy at Grenoble, or within a circumference of two leagues, on silkworms produced from 30 grammes of seed at least. Every person desirous of competing is to make known his intention to the administrator of the Commune where he proposes to make the experiment.

SCIENCE AND ART DEPARTMENT OF THE COMMITTEE OF COUNCIL ON EDUCATION.

RESULT OF EXAMINATIONS OF SCIENCE SCHOOLS AND CLASSES, MAY, 1863.

The total number of individuals under instruction in 1863, was 3,811; and, in 1862, 3.413; of these 869 were in uncertificated classes last year, and about 700 this, making the increase in students in certificated classes, between May, 1862, and May, 1863, 566. The total number of individual candidates who applied for examination in 1863 was 2,000, and in 1862, 1708. The number of papers worked in 1863 was 2,671; there being in practical, plane, and descriptive geometry, 288; in mechanical and machine drawing, 194; in building construction and naval architecture, 107; in theoretical mechanics, 35; in applied mechanics, 22; in acoustics, light, and heat, 121; in magnetism and electricity, 207; in inorganic chemistry, 679; in organic chemistry, 157; in geology, 129; in mineralogy, 46; in animal physiology, 343; in zoology, 41; in vegetable physiology and economic botany, 126; in systematic botany, 84; in mining, 29; in metallurgy, 63; in 1862, the total number of papers was 1,943. The number of provincial local centres, where examinations were held in 1863 was 64; and in 1862, 45. The number of metropolitan centres where examinations were held (including this department) was, in 1863, 7; in 1862, 9. In 1863, the total number of successes was 2,127, viz.:—Passes, 668; honourable mentions, 510; third grade prizes, 458; second grade prizes, 309; and first grade prizes, 182; and 544 failures. In 1862, the total number of successes was 1,480, viz.:—Passes, 791; third grade prizes, 296; second grade prizes, 237; and first grade prizes, 156; and 463 failures.

Home Correspondence.

UTILISATION OF SEWAGE.

SIR,—You will do good service to British agriculture by inserting the following very important letter from Baron Liebig. It settles definitively the question, hitherto much disputed, of the value of a ton of town sewage, taken at its outlet.

How much is to be deducted from that value for conveyance to the fields is another part of the question; but it is generally admitted that from one farthing to three farthings per ton, according to elevation, would be an ample deduction. It is strange that our Legislature or Government has never, by a Committee or a Commission, elicited engineering data on this point. At Croydon the cost is not more than one farthing per ton: at this rate there is ample scope for profit to the ratepayers as well as farmers, at Baron Liebig's estimate of fourpence per ton.

Hitherto nearly all our attempts at sewage irrigation by means of steam power, pipes, hose, and jet, have been imperfect, from a want of sound engineering skill; hence they have been unduly costly. A mistake of an inch in the diameter of our supply pipes may increase our expense of delivery 100 per cent.

When once we are agreed as to the value of a ton of town sewage, delivered on the land, we shall not long differ as to the propriety or profit of applying a given quantity per acre. Those who now advocate 10,000 tons per acre per annum will be brought, by the questions of cost and value, to much more reasonable conclusions. 10,000 tons per acre, at Baron Liebig's estimate of fourpence per ton, would amount to £166 13s. 4d.! Many farmers would be astonished at our even proposing to expend £5 per acre in manure or guano. What would they say to £166 13s. 4d. per acre?

We are all gradually coming to believe in Liebig's great theory that in order to build up a perfect plan we must have all the necessary materials or elements in due pro-

portion and in a fit condition. No one certainly would doubt this, if applied to a house—for, wanting either lime or water, useless would be the bricks, timber, slates, and other materials.

I am, Sir, your obedient servant,
J. J. MECHI.

Tiptree Hall, Kelvedon, Essex, August 15th, 1863.

Sir,—The agitation at present going on regarding the application of sewage to the purposes of agriculture, induces me to offer a few remarks which may perhaps assist to throw some light on the different questions belonging to this most important subject.

It seems to me that, on the whole, people have not a correct idea of the matter. In the last twenty years a new branch of industry, which did not before exist, has developed itself on a large scale, and in like manner the importation of guano and the sale of various manures have increased to such an enormous extent. The manufacturers of and dealers in manures are, on principle, inimical to the utilisation of sewage, and, in the battle which is being fought, they constitute the inimical army whose forces should be by no means underrated.

The contest which this question has renewed is an old one—the contest, namely, between commercial and industrial and the agricultural interest. The manufacturers of artificial manures fancy their business would stop if it should once happen that the towns supplied the farmer with the necessary manure. If we examine the matter thoroughly we shall find that the anxiety of the manufacturers and dealers in manure is like the panic of the carriers on the eve of the introduction of the railroads. They also feared that the rail would put an end to their business. Yet we know that, owing to the greater traffic, the number of horses in use has since then everywhere increased. The sewage question is most intimately connected with the manufacturers of manure; so much so indeed that the latter may derive from it the greatest profit. It may be even said that it is in reality the manufacture of artificial manure which gives to sewage its peculiar value and importance for the purposes of husbandry, and it is this which I shall endeavour to explain in what follows.

It is well known that the manufacture of artificial manure is based on the doctrine that the nourishment of all cultivated plants consists of inorganic or mineral substances. Manure consisting of inorganic substances can be produced by the agriculturist only. The farmer produces farmyard manure; the manufacturer, on the other hand, mineral manure, with which he furnishes the farmer with those efficient elements wanting in stable dung. The most important fabrication is that of superphosphate of lime. The question of immediate importance to be decided is the value to the farmer of the sewage used, and it is easy to find this by comparing sewage matter with guano, the effect and price of which are known to the farmer, and of whose value he is able to judge. The problem to be solved is, therefore, how much of the efficient elements of guano a farmer can convey to his field in a ton of sewage; or how many gallons of sewage water are equivalent to a cwt. of guano. Regarding the component parts of the best sorts of guano, we have certain and reliable data, those relating to sewer water are less so; but we might long ago have been fully informed of its average contents if, last year, at the mouth of each sewer in London, five gallons of water had been collected morning and evening every day during the week, and at the end of the seventh day one gallon of the collected seventy gallons subjected to chemical analysis. It would be necessary, of course, to determine as nearly as possible the quantity of water discharged at each sewer. Lacking more certain data, I take Professor Way's analysis of sewage water, which this most reliable chemist made at the request of the General Board of Health.

I reckon that Peru guano contains 14 per cent. of nitrogen (= 17 ammonia), 12 per cent. phosphoric acid, and 6-tenths per cent. of potash. Professor Way analysed the water of two sewers, one in Dorset-square, and the other in Barrett's-court, and found in one gallon of sewer water—

	Barrett's-court.	Dorset-square.
Ammonia	41·10 grs.	17·96 grs.
Phosphoric Acid	10·44 ,,	4·17 ,,
Potash	48·18 ,,	3·32 ,,

The difference in the contents of the two sewers is very great, for the first contains twenty-nine more ammonia and phosphoric acid, and fifteen times as much potash as the other. According to the analysis of Drs. Hoffman, Franckland, and others, I am of opinion that I may take the contents of the Dorset-square sewer water as the average standard for my calculation. From the above figures it results that 101 tons (20,200 gallons) of this sewer water contains the same amount of phosphoric acid, more than three times as much ammonia, and sixteen times as much potash, as one cwt. of the best Peruvian guano.

It will be observed that there is a great difference in the proportion of phosphoric acid to ammonia in guano and sewer water. In guano this proportion is 6 parts of phosphoric acid to 8½ parts of ammonia; in sewer water this proportion is 6 parts of phosphoric acid to 26 parts of ammonia. The reason of this disproportion in the amount of phosphoric acid and ammonia in sewer water is at once perceived, if we remember that the bones of the slaughtered animals do not find their way into the sewers. These bones are, however, the manuring matter in which phosphoric acid abounds, and their component parts, let it be well unstood, must be given back to the fields if it be intended that the soil shall retain its fertility. Potash and ammonia are, according to their prices, far more costly manures than phosphates, and in many cases quite as necessary for the field as this latter can be. Potash and ammonia are wholly inefficient and useless without the presence of phosphoric acid, but with the addition of phosphates they become efficient and valuable. The manufacturer of manure is not able to supply potash and ammonia to the farmer in sufficient quantity, and at an available price, but it is easy for him to collect the bones and make up the deficiency of phosphate by drawing it from natural sources.

It will, I think, be now perceptible what connection there is between the manufacture of superphosphate and the utilisation of sewage. If the farmer add to the sewer water the phosphate which is wanting in it, the efficiency of the water will be increased. Thus, 101 tons of sewer water to which 120 lbs. of superphosphate have been added are equivalent to 305 lbs. of Peruvian guano, and the value of the sewer water will be 305 lbs. of guano, at £13 12s. 6d. a ton, 498 pence; from this subtract the price of 120 lbs. of superphosphate, at £5 5s., 76 pence; which gives the value 101 tons sewer water, 422 pence, or 4d. for one ton. It must not be forgotten that sewage without the addition of phosphate is of much less value, because, if the farmer were to give the soil, in sewage, as much phosphoric acid as is in 305 lbs. guano, he would have to apply 305 tons of sewer water (instead of 101 tons), which would give the value of 1¼d. per ton. I am of opinion that the proportion of ammonia which is brought into the soil by dressing the land with Peruvian guano is much too large and even noxious for future crops; but this does not belong to the present question.

From exact calculation of the liquid and solid voidings of London (the detail of which would be out of place here) we may conclude that 42 tons of ammonia, 10 tons of phosphoric acid and 7½ tons of potash find their way into the London sewers daily. These 42 tons of ammonia are contained in 247 tons of guano, the 10 tons of phosphoric acid in 83·3 tons guano; thus 163·7 tons remain in which the phosphoric acid is wanting; or, what is the same thing, if to the sewage obtained daily from London 100 tons of superphosphate of lime (at 20 per cent. of phosphoric acid) be added, the value of the daily voidings of the metropolis, or the sewage of London, is made equivalent to 247 tons Peru-

vian guano; or, by the addition yearly of 36,500 tons of superphosphate, we may acquire the value of 90,155 tons guano, at £13 12s. 6d. = £1,228,364. Deduct the price of 36,500 tons of superphosphate, at £5 5s. = £191,628, and we have £1,036,736 as the money value of the sewage. To this should still be added the worth of the potash in the sewer water. Potash is the manure which the farmer obtains with the most difficulty; it is that element, too, which renders his stable dung (the amount of phosphoric acid and ammonia being the same) of greater value and efficacy. In 247 tons of guano about 1½ ton of potash are contained; but every day 7½ tons are obtained in the sewer water, which gives a surplus of 6 tons, corresponding to 11 tons of sulphate of potash, giving yearly 4,015 tons, which, at £18 per ton, shows a money value of £72,270. Add this to the sum above given, and we have, as real annual money value of the London sewerage, £1,109,006.

The surplus potash won from the sewer water daily corresponds to the amount contained in 866 tons of stable dung. Without the addition of the superphosphate, the value of the sewage of London would only be £304,045. In the calculation of the value of sewer water, there is one factor doubtful—viz., the absolute amount of phosphoric acid, ammonia, and potash which a ton of said water contains. It might, probably, be found that some sewer water was richer, another more diluted or poorer in these component parts, but in the relative proportion I do not think that any very great difference would be found. Sewer water will, in the average, contain more potash than I have allowed for, inasmuch as the fluid voidings of horses are to be added, which increase the amount of potash. We may assume that one-third of the population of Great Britain, or ten millions of men, live on corn and agricultural produce imported from abroad. For this a pretty considerable number of millions of pounds sterling must be paid, besides another pretty considerable number which must be earned by the nation in order to pay for the purchase of manures to produce the food of the remaining 20,000,000 of inhabitants. Many superficial observers appeal to statistics, which appear to show that much of the land yields one-third more than it did in the last century, but this is not, they say, a sign of decrease of fertility; but they forget at what costs their larger crops are obtained, and that they are due to an enormous expense of capital for the purchase of foreign manure. It is a sign of a poor or an exhausted soil, if, in order to get high returns, we have to add large quantities of manure from without; a rich or fertile soil does not require such an addition.

The employment of sewage in agriculture could make it possible to bring large tracts of land into cultivation which hitherto, owing to the expense of tillage, had been laid waste and neglected; others, too, might be so improved as to make the crops remunerative, and good yields would bring in a larger revenue. The vast capital which hitherto has left the country to pay for corn and manure might be kept at home and employed for other purposes. Should the present state of trade and industry not materially change, a great part of this capital would be devoted to agriculture, and the natural consequence would be that the increasing population would find ample occupation in husbandry. Great Britain is large enough, if we take the arable surface of the land, to produce all the corn and meat necessary for its inhabitants. It is neither fantastic nor ridiculous to believe that, without purchasing foreign manure, and by a judicious utilisation of the sewage of towns and villages, England would be able to dispense with the importation of food from abroad. For her it would be a blessing if the application of capital to agriculture were found sufficiently profitable to awaken speculation in this direction, so that the industrial population, manufacturers, and tradesmen, might devote themselves to the production of bread and meat. These men are quite of another stamp, and care little for tradition or the authority of custom. They know their multiplication table, however, and in competition with such men the farmers would find it impossible to persevere in their old jog-trot ways. The change thus brought about would be as great as after a revolution.

I am, Sir, your obedient servant,

JUSTUS VON LIEBIG,

President of the Royal Academy of Science, and Conservator-General of the Royal Scientific Museum.

PRESERVATION OF IRON PLATED AND OTHER SHIPS.

Sir,—It would appear by reading the two last numbers of the *Journal*, that the application of zinc and other metals, and their compounds, to the bottoms and sides of iron and wooden ships, so as to form a poisonous compound by the action of sea water, was a novel idea.

As early as 1851, while in San Francisco, California, I instituted a series of experiments with reference to the action of sea water on iron and wood when coated with various metallic compositions. The opportunity afforded for these investigations was particularly favourable, as the Pacific abounds in every description of molluscus, which destroy wooden structures of all kinds by eating into them so rapidly that in a few months a sound piece of timber resembles a honeycomb; the attachment of barnacles to the bottom of iron vessels, if unprotected, is so great as actually to seriously retard their sailing. The result of my experiments was in favour of the application of metallic zinc, as the chloride formed a slimy, slippery compound, corresponding to the butter of antimony, which is not only exceedingly poisonous, but very cheap and easy of application.

However, it was not until August, 1858, that I took out a patent, entitled "An Improved Coating Composition to Protect Vessels from Marine, Animal, and Vegetable Substances." As the specification will not occupy much of your space, I will give it in full—to wit:—

"I employ zinc, lead, and tin, either alone or in combination with such other metals, minerals, and metallic conpounds, as will form a chloride by the action of sea water, and preserve and keep clean the bottoms and sides of ships or vessels by preventing the attachment of marine, animal, and vegetable substances. For this purpose I make a coating composition in which exists the powder or finely divided particles of any one of the metals, zinc, lead, or tin, or their oxides, or a combination of metals, so that a chemical decomposition will take place by the action of the chlorides existing in sea water. This compound being applied to iron vessels, a metallic chloride is formed on the surface, and becomes a preventive against the fouling of the bottoms. In applying these compounds I first clean the bottom and sides of the vessel so as to remove all foreign matter, then I coat the bottom with tar, pitch, varnish, paint, or any other substance. This preliminary coating being perfectly dry, I coat the surface again with a composition of pitch, tar, varnish, or any other cohesive substance in which has been mixed and incorporated the metallic powder or particles of zinc, lead, tin, or a combination of them or their oxides. I prefer charging the cohesive medium to its maximum extent, without imparing its tenacious or adhering property. I apply it by means of a brush or rolling iron, or in sheets made on a coarse textile fabric, or otherwise. The result of this application or coating will be, that as the sea water holds in solution the chloride of sodium, potassium, and magnesium, it will act on the metallic particles contained in the composition, producing a poisonous chloride of the metal or metals used, which is destructive to both vegetable and animal existence. The chemical action will be accompanied by a slight disintegration of particles from the surface—in fine, continually presenting a clean or new surface; the chloride of zinc, lead, and tin, are exceedingly poisonous. These metals are easily reduced to a state of powder; the two former are of comparatively small cost." I confess I do not see how Monsieur Jean Pierre Jouvin can sustain his patent, taken out in 1863? Certainly when I use the words in my specification, "And such other metals, minerals, and metallic compounds as will

form a chloride by the action of sea water," no subsequent patentee can avail himself of this principle, as herein consists the very essence of the invention.

I am not now vindicating the merits of my invention for any personal motive, as, having failed to pay the £50 tax in 1861, it became the property of the public*

I may here mention that her Majesty's Government tested the invention on the sides and bottom of the *Lizard.* After being at sea for one year I received a notice that she was in dock at Sheerness, where I examined the bottom, and the result was most satisfactory.

I received the following from the Superintendent:—

"Sheerness, 1st November, 1860.

"Dear Sir,—I send you a copy of the report sent to the Admiralty by the shipwright officers of this yard on the examination of the *Lizard's* bottom, as well as my remarks on their report, which I trust will be satisfactory.

"I am, &c.,

"CHARLES WISE.

"Dr. Collyer."

Though I spent a vast deal of time and money in attempting to convince the government of the superiority of metallic zinc as a coating composition for iron ships, for some unaccountable reason I received no further information on the subject. I have always attributed my want of success to Sir B. Walker's absence from the Admiralty, as it was through his instrumentality that I obtained the opportunity of making the trial on the *Lizard's* bottom; be that as it may—though my composition was a great success in actual practice, it received no official patronage.

I am, &c.,

ROBERT H. COLLYER, M.D., F.C.S., &c.

Beta House, 8, Alpha-road, N.W., August 15, 1863.

* This is one of the many instances where the public neglect a patented invention, which has become public property by the non payment of the tax of £50 at the termination of three years. In my case the loss of the patent was necessity, not choice.

Proceedings of Institutions.

Berkhamsted Mechanics' Institute.—The seventeenth annual report of this Institute speaks of its continued prosperity, and of the general support extended towards it by all classes of the town and neighbourhood. The number of members is considerably in excess of any former year, and amounts to 21 honorary and 149 ordinary, making a total of 170. The librarian states that there is an increasing application for books, and 1,400 volumes of sound and healthy literature have been circulated during the past year; this pleasing fact may be taken as one of the best proofs of the good the Institute is accomplishing. It is a matter of regret to the committee that they have not been able to make any addition to the library during the past year, but from the satisfactory state of the treasurer's accounts, this addition can shortly be effected. The lectures of paid lecturers have been more expensive than productive, in a pecuniary sense, but this deficiency has been nearly met by the receipts at the gratuitous lectures and readings of several members of the Institute, to whom grateful acknowledgments are especially due. The local exhibition which has been held under the auspices of the Institute was visited by about 2,500 persons, producing in gross receipts the sum of £54 3s. 6d., and involving an expenditure of £46 11s., leaving a balance of £7 12s. 6d., to be carried to the general fund of the Institute. The thanks of the Institute are due to those of all classes who kindly lent for the exhibition, many and valuable works of art, objects of science, articles of curiosity, and productions of local manufacture. The best acknowledgments must also be rendered to those members of the Institute who ably and gratuitously contributed to several evenings' entertainments, by the performance of vocal and instrumental music. The committee close this brief record of the proceedings of the most successful year the Institute has experienced, with their best wishes for its increasing utility and prosperity. The treasurer's account shows that the receipts were £131 19s. 0¾d., and that there is a balance in hand of £18 7s. 1¼d.

Gilford Young Men's Mutual Improvement Society.—The last report says that up to the time of the last annual meeting 30 young men had been received into the Society, and during the past session 10 active and 13 honorary members were admitted. During the winter 17 essays and 5 public lectures were delivered in connection with the Society. A number of debates also came off, in which the members all took a deep interest. In consequence of the recent connection of this Society with the Society of Arts, classes have been established for the training of the members in the subjects for which that Society offers prizes and certificates.

London Bank of England Library and Literary Association.—The Thirteenth Annual Report of this Association says that the prosperity of the last twelve months has been fully equal to any previous year. The number of subscribers for the year 1862–3 has been 484, making, with 14 life members, a total of 498. The number of books now in the library is 9,683; 418 of which have been added during the past year; viz., 353 new volumes, 50 volumes of magazines, and 15 volumes purchased to replace worn-out copies. This increase is slightly less than that reported last year, which is to be accounted for by the fact that a small part of the income of the Association has been applied to opening a subscription with the "London Library Company." Early in the year it was deemed advisable to subscribe £5 5s. to that company, which course was found to be so advantageous to the Association, that it was soon after determined to increase the subscription to £10 10s.; at the same time, however, decreasing that to Mudie's Library to the same amount, instead of allowing the latter to remain at £15 15s., thus making the subscription to each library £10 10s. The advantage of this arrangement is that the librarians are enabled to obtain a larger number of copies of new and popular works than they were when the subscription was confined to one establishment. It may also be mentioned that the committee have been enabled to purchase 86 volumes of works of permanent value and interest, in very excellent condition, from Mudie's surplus stock, at a saving of 70 per cent. upon the publishing price, and of 50 per cent. if purchased of the bookseller to the Association. The Committee have again to acknowledge the liberal donation of £20 from Mrs. Thwaytes, through the President, and also the usual annual donation of £1 1s. from the long-continued friend of the Association, I. M. Parsons, Esq. They also desire to express their thanks to those gentlemen who have testified their interest in the success of the Association by the gift of books, &c. The new catalogue has been completed, and is now in the hands of the members. The committee desire gratefully to acknowledge the liberality of the Governors in having allowed the catalogue to be printed in the establishment. They also desire to express their acknowledgments to Mr. Coe, the superintendent of the printing department, for the typographical beauty of the work; to the librarians for their great zeal and care in its compilation, and to Mr. J. B. Scott for his kindness in assisting to bring so laborious a task to a successful issue. The financial statement shows that the receipts have been £303 13s. 5d., and that there is a balance in hand of £13 12s. 2d.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August 7th*, 1863.]

Dated 17th July, 1863.

1802. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machine knitting needles, and in machinery or apparatus for making the same. (A com.)

Dated 18th July, 1863.

1803. A. Clark, Gate-street, Lincoln's-inn fields—Imp. in revolving shutters and blinds, and in apparatus for the manufacture of the same.
1804. W. C. Page, Gabrick-street, Millwall—An improved mode of preventing and removing the incrustations in marine and land steam boilers.
1805. E. Holborrow, Buckingham street, Fitzroy-square, and I. Parker, Houghton-street, Clare-market—Imp. in the construction of sights for fire arms.
1807. F. J. Mavor, Park-street, Grosvenor square—Imp. in horse shoes.

Dated 20th July, 1863.

1809. F. A. Calvert, Manchester—Imp. in machinery for opening, cleaning, and preparing fibrous substances.
1811. T. Knowles, Hulme, Lancashire—Imp. in machinery for opening, carding, and cleaning cotton and other fibrous materials when in a manufactured or partly manufactured state.
1813. A. Smith, Stratford, Essex—Imp. in machinery for dragging bristles, applicable also to drawing or sorting fibres and hair of different lengths.
1815. A. A. Pelaz, Lyons, France—Certain imp. in printing stuffs and other fibrous fabrics.
1817. J. Layman, Thavies-inn — Imp. in micrometer draughting scales.
1819. J. Goold, Corsham, Wiltshire—Imp. in the manufacture of ink.

Dated 21st July, 1863.

1820. F. L. H. Danchell, Red Lion-square—Certain imp. in apparatus for purifying water.
1823. W. L. Aberdeen, Belfast—Improved machinery for breaking or softening and preparing flax, hemp, jute, tow, and other fibrous substances.
1825. E. T. Bainbridge, St. Paul's Church yard—Imp. in ventilators.
1827. G. Haseltine, 12, Southampton-buildings, Chancery lane—An improved implement for harrowing and smoothing land. (A com.)
1829. E. Alcan, King-street—Imp. in apparatus for condensing steam. (A com.)
1831. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of mats, floor cloths or coverings for floors, straps, bands, ropes, and other analogous articles which are usually made of textile or fibrous materials. (A com.)

Dated 22nd July, 1863.

1835. J. White, Trinity-street, Trinity-square—Imp. in pyramid and other cans or feeders for oil and other liquids.
1836. C. Beslay, 11, Rue Menilmontant, Paris—Imp. in making all woven and thready fabrics water-proof. (A com.)
1839. J. Simmons, Rainham, Sittingbourne, Kent—Imp. in ploughs.

Dated 24th July, 1863.

1850. J. Kirkland, Liverpool—Imp. in apparatus for working hydraulic presses.
1852. A. English, Hatfield—Imp. in apparatus for securing and protecting horses and other cattle during their transit by rail and other ways, and on board ship.
1854. B. Birnbaum, 21, New Broad-street—Imp. in gaiters and leggings.

Dated 25th July, 1863.

1856. G. H. James, J. M. James, and J. James, 10, Dyer's-buildings, Holborn—Imp. in the manufacture of covers for purses, wallets, and pocket books.
1860. C. Crockford, Holywell, Flintshire—Imp. in the treatment and utilisation of certain of the waste products from the manufacture of alkali and bleaching powder, and also from certain smelting operations.

Dated 27th July, 1863.

1862. W. Tranter, Birmingham—Imp. in breech-loading and other revolving fire-arms.
1964. T. Thorne, Southsea—Improved apparatus for disengaging ships' boats.
1866. R. A. Brooman, 166, Fleet-street—Imp. in sleepers or supports for the rails of railways. (A com.)
1868. J. Whittaker, Mons Mill with Walton-le-Dale, Lancashire—Imp. in engines for obtaining motive power by steam, air, or any other vapour.

Dated 28th July, 1863.

1874. J. Jewell, Devoran, near Truro, Cornwall—Imp. in setting boilers.

Dated 29th July, 1863.

1876. J. Sainty, Burnham Market, Norfolk—Imp. in the construction of feeding troughs for sheep and other cattle.
1878. N. Thompson, Abbey-gardens, St. John's-wood—Imp. in apparatus for stopping the bung holes of casks and similar vessels, also in tools or implements for fixing and removing such stopping apparatus.
1880. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—An improved self-acting flushing apparatus. (A com.)
1882. E. Sturge, Walworth—Imp. in coating or protecting metallic surfaces.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1900. R. Stewart, Elmira, New York—Imp. in operating the cut off valves of steam engines.—31st July, 1863.

[*From Gazette, August 14th*, 1863.]

Dated 22nd April, 1863.

999. T. Settle, Bolton—Certain imp. in "flyers" to be employed in roving, slubbing, and spinning cotton and other fibrous substances.

Dated 8th May, 1863.

1151. H. Schooling, 5, 6, and 7, North side, Bethnal-green—Imp. in moulding or shaping lozenge paste or other plastic materials.
1154. J. H. Bailey, New York—An improved mechanical movement for producing an impelled current of air for lamps, and which may be used for other purposes. (A com.)

Dated 23rd May, 1863.

1293. E. Barlow, Bolton, J. Ashworth, jun., Turton, near Bolton, J. Newhouse, Farnworth, near Bolton, and F. Hamilton and W. Hope, Bolton—Imp. in lap machines for preparing cotton and other fibrous substances.

Dated 3rd June, 1863.

1385. E. A. Locke, Boston, Suffolk, U.S.—Improved means of securing identifying labels or tags to bales of fibrous material. (Partly a com.)

Dated 20th June, 1863.

1497. T. Petitjean, Geneva, Switzerland—Imp. in the manufacture of glass.

Dated 25th June, 1863.

1603. W. Kirrage, 1, Victoria-street, City—Using Apo elastikon hyphasma as a new and improved cloth for floors, roofs, walls, tanks, and other linings, being impervious to damp and of great strength and durability.

Dated 2nd July, 1863.

1649. W. Miller, 70, Upper Stamford-street, Blackfriars—An improved mode of evaporating through the combined agencies of heat and centrifugal force, and the machinery employed therein, more particularly applicable to saccharine solutions.

Dated 6th July, 1863.

1673. J. Samuel, 26, Great George-street, Westminster—Imp. in the manufacture of gas for lighting and heating purposes, and in apparatus connected therewith.
1678. H. Caunter, Stornoway—An improved lubricating matter or composition.

Dated 7th July, 1863.

1681. C. Schiele, 20, Milton street, Manchester—Imp. in turbines.
1687. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the construction of seats, chairs, sofas, lounges, and other similar articles of furniture. (A com.)

Dated 8th July, 1863.

1695. H. Armstrong, Whitby, Yorkshire—Imp. in the manufacture of alum.

Dated 9th July, 1863.

1713. W. V. Wilson, Jubilee-street, Mile end—Imp. in the manufacture of red colouring matter.

Dated 11th July, 1863.

1735. A. Dixon, Harborne, Staffordshire, and J. Pumphrey, Birmingham—A new fastener or holder for flowers or other decorations to coats and articles of dress.

Dated 13th July, 1863.

1743. R. D. Dwyer, Warrington, Lancashire—Imp. in the construction of letter copying presses.
1749. R. A. Brooman, 166, Fleet-street—Imp. in apparatus for suspending chandeliers, gaseliers, and other weights. (A com.)

Dated 14th July, 1863.

1765. J. L. Todd, Belfast—Imp. applicable to the rollers of machines employed for spinning fibrous materials whilst in a wet state.

Dated 16th July, 1863.

1785. C. Stoker, Leigh Sinton, Worcestershire—An improved expanding and contracting horse collar.
1787. J. Lamb and S. Tovey, Kidderminster—Imp. in looms for weaving carpets.

Dated 17th July, 1863.

1795. J. Darrieux, Candéran, France—Pounded glass powder for cleaning metals, and also for tooth powder.

Dated 21st July, 1863.

1822. W. Clarke, Forest-road, Nottingham—Imp. in the manufacture of fabrics in twist lace machinery.

Dated 22nd July, 1863.

1833. J. Ronald, Liverpool—Imp. in apparatus for dressing or preparing for spinning hemp, flax, Manilla hemp, and other like fibrous material.

Dated 23rd July, 1863.

1840. W. Cole, 15, Wentworth-road, Bow-road—Imp. in apparatus for securing the safety of persons in window cleaning or otherwise working outside of windows.
1841. A. T. Holden, Birmingham — Imp. in carriage and other springs.
1842. L. L. J. Fillion, 10, Rue de la Fidelité, Paris—Imp. in apparatus for extinguishing chimney fires, and in preventing explosions.
1843. M. A. Soul, 3, Leadenhall-street—Imp. in expelling solid and liquid refuse matter from steam and sailing ships below the water line, applicable also for discharging cannon below water from ships and forts, and in part for charging gas retorts and iron furnaces, and for other similar useful purposes. (A com.)
1845. W. Garforth and J. Garforth, Dukinfield, Cheshire—Certain inp. in preparing, beetling, or finishing textile fabrics, such as cotton, wool, linen, or other fibrous materials.
1847. W. Horton, Glasgow—Imp. in fire arms.
1849. T. Perkins, Exchange-buildings, Hitchen, Hertfordshire—Imp. in horse rakes and hand rakes.

Dated 24th July, 1863.

1851. W. L. Barnes, M.A., Chippenham—An improved method of breaking the speed of and stopping railway trains or other locomotive wheeled carriage or carriages, at the same time signalling to the driver, or for using the signal and break separately.
1853. T. Sturgeon, Belle Sauvage-yard—Imp. in chains.

Dated 25th July, 1863.

1855. T. C. Bull and T. Morgan, Wolbley, Hereford—An apparatu for collecting fruit from trees without injury.
1857. P. E. Gay, 5, Rue de Grenelle, St. Honoré, Paris—Imp. in boring apparatuses.
1858. J. Boyd, Glasgow—Improved mechanism for forming imitation selvages or longitudinal cords in weaving.
1859. F. Tolhausen, 17, Faubourg Montmartre, Paris—Imp. in the manufacture of gun barrels. (A com.)

Dated 27th July, 1863.

1861. J. W. Welch, Manchester—Imp. in sizing and finishing fabrics, and in the machinery or apparatus employed therein.
1863. F. Ford and L. Ford, Gloucester—Imp. in the manufacture of various articles with surfaces in imitation of different kinds of marbles or similar ornamental materials.
1867. J. Pain, Fort-street, Spitalfields—Imp. in the manufacture of umbrellas and parasols.

Dated 28th July, 1863.

1873. D. Taylor, Bonchester-bridge, Roxburgh, N.B.—Imp. in ventilating hay, corn, and other ricks, and in apparatus connected therewith.
1875. W. T. Smith, Dalston—An improved method of securing or tightening the cords of blinds and other rollers.

Dated 29th July, 1863.

1877. P. H. Girardin, Paris—Imp. in lamps.
1879. G. Rickarby, St. Giles's-road, and T. A. Barrett, 73, Observatory-street, Oxford—Imp. in window frames and sashes.
1881. W. E. Newton, 66, Chancery-lane—Imp. in cartridges. (A com.)

Dated 30th July, 1863.

1883. G. Inskeep, Madeley, Stafford—An improved mill for grinding bones, grain, logwood, and such like substances.
1885. J. Boeddinghaus, Elberfeld, Prussia—Imp. in means or appar tus for the production of printed or particoloured yarns.
1886. J. T. Stevens and C. Hoare, Bridport, Dorsetshire—Imp. in machinery for the manufacture of yarns, threads, laid twine, and other cordage.
1888. W. Firth and S. Firth, Burnley, near Leeds—Imp. in machinery and apparatus for working coal and other mines, and in apparatus for loading waggons or other vehicles.
1890. R. Hoe, Leadenhall-street, and H. J. Cole, New-street, Kennington-road—Imp. in fastenings for packing cases.
1891. T. Apps, Lower Norwood - Imp. in four-wheeled vehicles.

Dated 31st July, 1863.

1892. W. Graham and J. Graham, Burnley—Certain imp. in looms for weaving.
1893. G. Sigl, Vienna—Imp. in the construction of force pumps.
1895. J. P. Culverwell, Dublin—Imp. in railway lamps.
1896. J. B. Andreux, 12, Rue Notre Dame de Nazareth, Paris—Imp. in the application of steam to toy boats, or other similar toys where steam can be employed as a motive power.
1898. J. F. Dickson, Bouverie street, Fleet-street—Imp. in the manufacture of boots and shoes.

Dated 1st August, 1863.

1901. W. Cotton, Loughborough, Leicestershire—Imp. in the manuof looped fabrics, and in machinery or apparatus employed therein.
1902. R. A Brooman, 166, Fleet-street—Imp. in dyeing mixed animal and vegetable fibres, whether in a raw or manufactured state. (A com.)
1903. R. A. Brooman, 166, Fleet street—An improved warming pan. (A com.)
1904. G. Taylor, Leeds—Imp. in shaping boiler and other plates, and in apparatus employed therein.
1905. J. Hoefler, Manchester—Certain imp. in the method of preparing and treating "Codilla fibre" and tow, to render them available as a substitute for cotton, or to be mixed therewith.
1906. J. Kirk, Burnley—Certain imp. in looms for weaving.
1910. T. Fellowes and H. Hemfrey, Spalding—Imp. in apparatus for elevating straw and other agricultural produce.
1911. J. E. Vanner, Coleman-street—Imp. in the manufacture of umbrellas and parasols.

Dated 3rd August, 1863.

1912. E. A. Cowper, 35A, Great George-street, Westminster—Imp. in self-acting mules for spinning.
1913. J. W. P. Field, 223, High Holborn—Imp. in the manufacture of sheaths or cases for staves or other similar weapons.
1916. H. Woods, Burton upon-Trent—Imp. in the apparatus used for regulating the temperature during the process of fermentation in the "union cask," "tunning cask," or "cleansing cask."
1917. J. Munro, 13, Melton-street, Euston-square—Imp. in apparatus for producing optical illusions.

Dated 4th August, 1863.

1919. J. Abrahams, 9, Great Prescott-street, Goodman's-fields (East)—Imp. in brakes for railway and other carriages.
1920. T. H. Baylis, 55, Mornington-road, Regent's-park—Imp. in hawse pipes, mooring pipes, and deck chain pipes.
1921. G. Stevens, Malvern-cottages, Portland-place-north, Clapham-road—Imp. in means or apparatus for effecting a regular supply of air or aeriform fluids for various purposes.
1922. S. Bury and J. Price, Manchester—Certain imp. in valves for steam engines.
1925. W. E. Newton, 66, Chancery-lane—Imp. in machinery or apparatus for moulding and casting hollow projectiles. (A com.)
1926. E. Pace, Queen-street—Imp. in machinery for cutting splints for matches, and for collecting the same.
1927. T. Pickersgill, Huddersfield—Imp. in machinery or apparatus for feeding wool, cotton, and other fibrous materials into machines for preparing the same for spinning.

Dated 5th August, 1863.

1929. G. Clark, 30, Craven-street, Strand—Imp. in the construction and protection of ships, vessels, and floating batteries, and in the preparation and arrangement of materials for those purposes, some of such imps. being applicable to the construction and protection of land fortifications.
1931. W. Storer and J. Hancock, Nottingham—Imp. in electro-motive engines.
1932. C. Garton, Bristol, and T. Hill, Southampton—Imp. in evaporating and cooling.
1934. A. V. Newton, 66, Chancery-lane—An improved mode of and apparatus for producing stereotype plates. (A com.)

Dated 6th August, 1863.

1940. J. Tenwick, Clarendon-street, Landport, Portsmouth—Imp. in self-acting valves and traps for sewers.
1942. W. Clark, 53, Chancery-lane—Imp. in ovens. (A com.)
1946. J. Kirkham, Euston-road —Improved apparatus for generating heat for smelting and other purposes.

Patents Sealed.

[*From Gazette, August* 18*th*, 1863.]

15th August.

430. J. Gimson.
431. E. Deville.
432. J. Durrant.
438. E. Strawson.
442. J. F. Spencer.
443. J. H. Bly.
448. G. T. Bousfield.
449. J. Puntis and G. Cox.
452. T. Markland and J. C. Dickinson.
459. H. B. Barlow.
461. W. Marsden.
462. C. Billingsley.
463. J. Bentley and H. Booth.
464. C. W. Siemens.
466. R. Bell.
1163. W. E. Gedge.
1167. W. Boaler.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, August* 18*th*, 1863.]

11th August.

1968. E. Wroughton & T. Holmes.
1991. R. Mole and F. M. Mole.

12th August.

1979. W. Walton.
1980. C. Green and W. Asbury.
2261. W. E. Newton.

14th August.

1976. W. Holms and J. Oldfield.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, August* 18*th*, 1863.]

14th August.

1913. W. Tranter.

Journal of the Society of Arts.

FRIDAY, AUGUST 28, 1863.

SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

NOTICE TO MEMBERS.

In accordance with the Report adopted at the General Meeting held on the 17th ult., additional subscriptions for carrying out the Society's Memorial of His Royal Highness the Prince Consort are invited.

Any member desiring to subscribe, or to increase the amount of his subscription, is requested to send a Cheque or Post-office Order, made payable to Mr. Samuel Thomas Davenport, the Financial Officer.

NOTICE TO INSTITUTIONS.

The Programme for the Examinations for 1864 is now ready, and may be had *gratis*, on application to the Secretary of the Society of Arts.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Thirty-third Meeting of the British Association for the Advancement of Science commenced, in Newcastle-upon-Tyne, on Wednesday, the 26th of August, 1863, under the direction of the following officers :—

President—Sir William G. Armstrong, C.B., LL.D., F.R.S.

Vice-Presidents—Sir Walter Trevelyan, Bart.; Sir Charles Lyell, LL.D., D.C.L., F.R.S., F.G.S.; Hugh Taylor, Esq.; Isaac Lowthian Bell, Esq.; Nicholas Wood, Esq.; the Rev. Temple Chevallier, B.D., F.R.A.S.; William Fairbairn, Esq., LL.D., F.R.S.

General Secretaries—William Hopkins, Esq., M.A., F.R.S.; John Phillips, Esq., M.A., LL.D., F.R.S., Professor of Geology in the University of Oxford.

Assistant General Secretary—George Griffith, Esq., M.A., Deputy Professor of Experimental Philosophy in the University of Oxford.

General Treasurer—William Spottiswoode, Esq., M.A., F.R.S., F.G.S., F.R.A.S., &c.

Local Secretaries for the Meeting at Newcastle-upon-Tyne—Captain Noble; Augustus H. Hunt, Esq.; R. C. Clapham, Esq.

Local Treasurer for the Meeting at Newcastle-upon-Tyne—Thomas Hodgkin, Esq.

The First General Meeting was held at eight p.m., when the President delivered an address, as follows:—

I esteem it the greatest honour of my life that I am called upon to assume the office of your President. In that capacity, and as representing your body, I may be allowed to advert to the gratifying reception which the British Association met with on their former visit to this region of mining and manufacturing industry, and, as a member of the community which you have again honoured with a visit, I undertake to convey to you the assurance of a renewed and hearty welcome. A quarter of a century has elapsed since the Association assembled in this town, and in no former period of equal duration has so great a progress been made in physical knowledge. In mechanical science, and especially in those branches of it which are concerned in the application of steam power to effect interchange between distant communities, the progress made since 1838 has no parallel in history. The railway system was then in its infancy, and the great problem of trans-Atlantic steam navigation had only received its complete solution in the preceding year. Since that time railways have extended to every continent, and steamships have covered the ocean. These reflections claim our attention on this occasion, because the locality in which we hold our present meeting is the birthplace of railways, and because the coal mines of this district have contributed more largely than any others to supply the motive power by which steam communication by land and water has been established on so gigantic a scale.

The history of railways shows what grand results may have their origin in small beginnings. When coal was first conveyed in this neighbourhood from the pit to the shipping-place on the Tyne, the pack-horse, carrying a burden of 3 cwt., was the only mode of transport employed. As soon as roads suitable for wheeled carriages were formed, carts were introduced, and this first step in mechanical appliance to facilitate transport had the effect of increasing the load which the horse was enabled to convey from 3 cwt. to 17 cwt. The next improvement consisted in laying wooden bars or rails for the wheels of the carts to run upon, and this was followed by the substitution of the four-wheeled wagon for the two-wheeled cart. By this further application of mechanical principles the original horseload of 3 cwt. was augmented to 42 cwt. These were important results, and they were not obtained without the shipwreck of the fortunes of at least one adventurous man whose ideas were in advance of the times in which he lived. We read, in a record published in the year 1649, that "one Master Beaumont, a gentleman of great ingenuity and rare parts, adventured into the mines of Northumberland with his £30,000, and brought with him many rare engines not then known in that shire, and wagons with one horse to carry down coal from the pits to the river, but within a few years he consumed all his money and rode home upon his light horse." The next step in the progress of railways was the attachment of slips of iron to the wooden rails. Then came the iron tramway, consisting of cast-iron bars of an angular section: in this arrangement the upright flange of the bar acted as a guide to keep the wheel on the track. The next advance was an important one, and consisted in transferring the guiding flange from the rail to the wheel: this improvement enabled cast-iron edge rails to be used. Finally, in 1820, after the lapse of about 200 years from the first employment of wooden bars, wrought-iron rails, rolled in long lengths, and of suitable section, were made in this neighbourhood, and eventually superseded all other forms of railway. Thus, the railway system, like all large inventions, has risen to its present importance by a series of steps; and so gradual has been its progress, that Europe finds itself committed to a gauge fortuitously determined by the distance between the wheels of the carts for which wooden rails were originally laid down.

Last of all came the locomotive engine,—that crowning achievement of mechanical science,—which enables us to convey a load of 200 tons at a cost of fuel scarcely exceeding that of the corn and hay which the original pack-horse consumed in conveying its load of 3 cwt. an equal distance.

It was chiefly in this locality that the railway system was thus reared from earliest infancy to full maturity, and amongst the many names associated with its growth, that of George Stephenson stands pre-eminent.

In thus glancing at the history of railways, we may

observe how promptly the inventive faculty of man supplies the device which the circumstances of the moment require. No sooner is a road formed fit for wheeled carriages to pass along, than the cart takes the place of the pack-saddle: no sooner is the wooden railway provided than the wagon is substituted for the cart: and no sooner is an iron railway formed, capable of carrying heavy loads, than the locomotive engine is found ready to commence its career. As in the vegetable kingdom fit conditions of soil and climate quickly cause the appearance of suitable plants, so in the intellectual world fitness of time and circumstance promptly calls forth appropriate devices. The seeds of invention exist, as it were, in the air, ready to germinate whenever suitable conditions arise, and no legislative interference is needed to ensure their growth in proper season.

The coal-fields of this district, so intimately connected with the railway system, both in its origin and maintenance, will doubtless receive much attention from the Association at their present meeting.

To persons who contend that all geological phenomena may be attributed to causes identical in nature and degree with those now in operation, the formation of coal must present peculiar difficulty. The rankness of vegetation which must have existed in the carboniferous era, and the uniformity of climate which appears to have prevailed almost from the Poles to the Equator, would seem to imply a higher temperature of the earth's crust, and an atmosphere more laden with humidity and carbonic acid than exist in our day. But whatever may have been the geological conditions affecting the origin of coal, we may regard the deposits of that mineral as vast magazines of power stored up at periods immeasurably distant for our use.

The principle of conservation of force and the relationship now established between heat and motion, enable us to trace back the effects which we now derive from coal to equivalent agencies exercised at the periods of its formation. The philosophical mind of George Stephenson, unaided by theoretical knowledge, rightly saw that coal was the embodiment of power originally derived from the sun. That small pencil of solar radiation which is arrested by our planet, and which constitutes less than the 2000-millionth part of the total energy sent forth from the sun, must be regarded as the power which enabled the plants of the carboniferous period to wrest the carbon they required from the oxygen with which it was combined, and eventually to deposit it as the solid material of coal. In our day, the reunion of that carbon with oxygen restores the energy expended in the former process, and thus we are enabled to utilise the power originally derived from the luminous centre of our planetary system.

But the agency of the sun in originating coal does not stop at this point. In every period of geological history the waters of the ocean have been lifted by the action of the sun and precipitated in rain upon the earth. This has given rise to all those sedimentary actions by which mineral substances have been collected at particular localities, and there deposited in a stratified form with a protecting cover to preserve them for future use. The phase of the earth's existence suitable for the extensive formation of coal appears to have passed away for ever; but the quantity of that invaluable mineral which has been stored up throughout the globe for our benefit, is sufficient (if used discreetly) to serve the purposes of the human race for many thousands of years. In fact, the entire quantity of coal may be considered as practically inexhaustible. Turning, however, to our own particular country, and contemplating the rate at which we are expending those seams of coal which yield the best quality of fuel, and can be worked at the least expense, we shall find much cause for anxiety. The greatness of England much depends upon the superiority of her coal in cheapness and quality over that of other nations; but we have already drawn from our choicest mines a far larger quantity of coal than has been raised in all other parts of the world put together, and the time is not remote when we shall have to encounter the disadvantage of increased cost of working and diminished value of produce.

Estimates have been made at various periods of the time which would be required to produce complete exhaustion of all the accessible coal in the British Islands.

These estimates are extremely discordant; but the discrepancies arise, not from any important disagreement as to the available quantity of coal, but from the enormous difference in the rate of consumption at the various dates when the estimates were made, and also from the different views which have been entertained as to the probable increase of consumption in future years. The quantity of coal yearly worked in the British mines has been almost trebled during the last twenty years, and has probably increased tenfold since the commencement of the present century; but as this increase has taken place pending the introduction of steam navigation and railway transit, and under exceptional conditions of manufacturing development, it would be too much to assume that it will continue to advance with equal rapidity. The statistics collected by Mr. Hunt, of the Mining Record Office, show that at the end of 1861 the quantity of coal raised in the United Kingdom had reached the enormous total of 86 millions of tons, and that the average annual increase of the eight preceding years amounted to $2\frac{3}{4}$ millions of tons. Let us inquire, then, what will be the duration of our coal-fields if this more moderate rate of increase be maintained.

By combining the known thickness of the various workable seams of coal, and computing the area of the surface under which they lie, it is easy to arrive at an estimate of the total quantity comprised in our coal-bearing strata. Assuming 4,000 feet as the greatest depth at which it will ever be possible to carry on mining operations, and rejecting all seams of less than 2 feet in thickness, the entire quantity of available coal existing in these Islands has been calculated to amount to about 80,000 millions of tons, which, at the present rate of consumption, would be exhausted in 930 years, but, with a continued yearly increase of $2\frac{3}{4}$ millions of tons, would only last 212 years. It is clear that long before complete exhaustion takes place, England will have ceased to be a coal-producing country on an extensive scale. Other nations, and especially the United States of America, which possess coal-fields 37 times more extensive than ours, will then be working more accessible beds at a smaller cost, and will be able to displace the English coal from every market. The question is, not how long our coal will endure before absolute exhaustion is effected, but how long will those particular coal-seams last which yield coal of a quality and at a price to enable this country to maintain her present supremacy in manufacturing industry. So far as this particular district is concerned, it is generally admitted that 200 years will be sufficient to exhaust the principal seams even at the present rate of working. If the production should continue to increase as it is now doing, the duration of those seams will not reach half that period. How the case may stand in other coal-mining districts I have not the means of ascertaining; but as the best and most accessible coal will always be worked in preference to any other, I fear the same rapid exhaustion of our most valuable seams is everywhere taking place. Were we reaping the full advantage of all the coal we burn, no objection could be made to the largeness of the quantity, but we are using it wastefully and extravagantly in all its applications. It is probable that fully one-fourth of the entire quantity of coal raised from our mines is used in the production of heat for motive power; but, much as we are in the habit of admiring the powers of the steam-engine, our present knowledge of the mechanical energy of heat shows that we realise in that engine only a small part of the thermic effect of the fuel. That a pound of coal should, in our best engines, produce an effect equal to raising a weight of a million pounds a foot high, is a result

which bears the character of the marvellous, and seems to defy all further improvement. Yet the investigations of recent years have demonstrated the fact that the mechanical energy resident in a pound of coal, and liberated by its combustion, is capable of raising to the same height ten times that weight. But although the power of our most economical steam-engines has reached, or perhaps somewhat exceeded, the limit of a million pounds raised a foot high per lb. of coal, yet, if we take the average effect obtained from steam-engines of the various constructions now in use, we shall not be justified in assuming it at more than one-third of that amount. It follows, therefore, that the average quantity of coal which we expend in realising a given effect by means of the steam-engine is about 30 times greater than would be requisite with an absolutely perfect heat-engine.

The causes which render the application of heat so uneconomic in the steam-engine have been brought to light by the discovery of the dynamical theory of heat; and it now remains for mechanicians, guided by the light they have thus received, to devise improved practical methods of converting the heat of combustion into available power.

Engines in which the motive power is excited by the communication of heat to fluids already existing in the aeriform condition, as in those of Stirling, Ericsson, and Siemens, promise to afford results greatly superior to those obtained from the steam-engine. They are all based upon the principle of employing fuel to generate sensible heat, to the exclusion of latent heat, which is only another name for heat which has taken the form of unprofitable motion amongst the particles of the fluid to which it is applied. They also embrace what is called the regenerative principle—a term which has, with reason, been objected to, as implying a restoration of expanded heat. The so-called "regenerator" is a contrivance for arresting unutilized heat rejected by the engine, and causing it to operate in aid and consequent reduction of fuel.

It is a common observation that before coal is exhausted some other motive agent will be discovered to take its place, and electricity is generally cited as the coming power. Electricity, like heat, may be converted into motion, and both theory and practice have demonstrated that its mechanical application does not involve so much waste of power as takes place in a steam-engine; but whether we use heat or electricity as a motive power, we must equally depend upon chemical affinity as the source of supply. The act of uniting to form a chemical product liberates an energy which assumes the form of heat or electricity, from either of which states it is convertible into mechanical effect. In contemplating, therefore, the application of electricity as a motive power, we must bear in mind that we shall still require to effect chemical combinations, and in so doing to consume materials. But where are we to find materials so economical for this purpose as the coal we derive from the earth and the oxygen we obtain from the air? The latter costs absolutely nothing; and every pound of coal, which in the act of combustion enters into chemical combination, renders more than two and a half pounds of oxygen available for power. We cannot look to water as a practicable source of oxygen, for there it exists in the combined state, requiring expenditure of chemical energy for its separation from hydrogen. It is in the atmosphere alone that it can be found in that free state in which we require it, and there does not appear to me to be the remotest chance, in an economic point of view, of being able to dispense with the oxygen of the air as a source either of thermo-dynamic or electro-dynamic effect. But to use this oxygen we must consume some oxidisable substance, and coal is the cheapest we can procure.

There is another source of motive power to which I am induced to refer, as exhibiting a further instance in which solar influence affords the means of obtaining mechanical effects from inanimate agents. I allude to the power of water descending from heights to which it has been lifted by the evaporative action of the sun. To illustrate the great advantage of collecting water for power in elevated situations, I may refer to the water-works of Greenock, where the collecting reservoirs are situated at an elevation of 512 feet above the river Clyde. The daily yield of these reservoirs is said to be nearly 100,000 tons of water, which is derived from the rainfall on an area of 5,000 acres. The power obtained from this quantity and head of water is equal to that of a steam-engine of about 2,000 horse power, and the whole effect might be realised on the margin of the river, by bringing down the water in a pipe of sufficient capacity, and causing it to act as a column on suitable machinery at the foot of the descent. But the hydraulic capabilities of the Greenock reservoirs sink into insignificance when compared with those of other localities where the naturally collected waters of large areas of surface descend from great elevations in rapid rivers or vertical falls. Alpine regions abound in falls which, with the aid of artificial works to impound the surplus water and equalise the supply, would yield thousands of horse-power; and there is at least one great river in the world which in a single plunge developes sufficient power to carry on all the manufacturing operations of mankind, if concentrated in its neighbourhood. Industrial populations have scarcely yet extended to those regions which afford this profusion of motive power, but we may anticipate the time when these natural falls will be brought into useful operation. In that day the heat of the sun, by raising the water to heights from which to flow in these great rapids and cascades, will become the means of economising the precious stores of motive power, which the solar energy differently directed has accumulated at a remote period of geological history, and which when once expended may probably never be replaced.

I have hitherto spoken of coal only as a source of mechanical power, but it is also extensively used for the kindred purpose of relaxing those cohesive forces which resist our efforts to give new forms and conditions to solid substances. In these applications, which are generally of a metallurgical nature, the same wasteful expenditure of fuel is everywhere observable. In an ordinary furnace employed to fuse or soften any solid substance, it is the excess of the heat of combustion over that of the body heated which alone is rendered available for the purpose intended. The rest of the heat, which in many instances constitutes by far the greater proportion of the whole, is allowed to escape uselessly into the chimney. The combustion also in common furnaces is so imperfect, that clouds of powdered carbon, in the form of smoke, envelope our manufacturing towns, and gases, which ought to be completely oxygenized in the fire, pass into the air with two-thirds of their heating power undeveloped.

Some remedy for this state of things, we may hope, is at hand, in the gas regenerative furnaces recently introduced by Mr. Siemens. In these furnaces the rejected heat is arrested by a so-called "regenerator," as in Stirling's air-engine, and is communicated to the new fuel before it enters the furnace. The fuel, however, is not solid coal, but gas previously evolved from coal. A stream of this gas raised to a high temperature by the rejected heat of combustion is admitted into the furnace, and there meets a stream of atmospheric air also raised to a high temperature by the same agency. In the combination which then ensues, the heat evolved by the combustion is superadded to the heat previously acquired by the gases. Thus, in addition to the advantage of economy, a greater intensity of heat is attained than by the combustion of unheated fuel. In fact, as the heat evolved in the furnace, or so much of it as is not communicated to the bodies exposed to its action, continually returns to augment the effect of the new fuel, there appears to be no limit to the temperature attainable, except the powers of resistance in the materials of which the furnace is composed.

With regard to smoke, which is at once a waste and a nuisance, having myself taken part with Dr. Richardson and Mr. Longridge in a series of experiments made in

this neighbourhood in the years 1857-58 for the purpose of testing the practicability of preventing smoke in the combustion of bituminous coal in steam-engine boilers, I can state with perfect confidence that, so far as the raising of steam is concerned, the production of smoke is unnecessary and inexcusable. The experiments to which I refer proved beyond a doubt, that by an easy method of firing, combined with a due admission of air and a proper arrangement of firegrate, not involving any complexity, the emission of smoke might be perfectly avoided, and that the prevention of the smoke increased the economic value of the fuel and the evaporating power of the boiler. As a rule, there is more smoke evolved from the fires of steam-engines than from any others, and it is in these fires that it may be most easily prevented. But in the furnaces used for most manufacturing operations the prevention of smoke is much more difficult, and will probably not be effected until a radical change is made in the system of applying fuel for such operations.

Not less wasteful and extravagant is our mode of employing coal for domestic purposes. It is computed that the consumption of coal in dwelling-houses amounts in this country to a ton per head per annum of the entire population; so that upwards of twenty-nine millions of tons are annually expended in Great Britain alone for domestic use. If any one will consider that one pound of coal applied to a well-constructed steam-engine boiler evaporates 10lbs., or one gallon of water, and if he will compare this effect with the insignificant quantity of water which can be boiled off in steam by a pound of coal consumed in an ordinary kitchen fire, he will be able to appreciate the enormous waste which takes place by the common method of burning coal for culinary purposes. The simplest arrangements to confine the heat and concentrate it upon the operation to be performed would suffice to obviate this reprehensible waste. So also in warming houses we consume in our open fires about five times as much coal as will produce the same heating effect when burnt in a close and properly constructed stove. Without sacrificing the luxury of a visible fire, it would be easy, by attending to the principles of radiation and convection, to render available the greater part of the heat which is now so improvidently discharged into the chimney. These are homely considerations—too much so, perhaps, for an assembly like this; but I trust that an abuse involving a useless expenditure exceeding in amount our income-tax, and capable of being rectified by attention to scientific principles, may not be deemed unworthy of the notice of some of those whom I have the honour of addressing.

The introduction of the Davy lamp was a great event in the history of coal-mining, not as effecting any great diminution of those disastrous accidents which still devastate every colliery district, but as a means of enabling mines to be worked which, from their greater explosive tendencies, would otherwise have been deemed inaccessible. Thus, while the Davy lamp has been of great benefit both to the public and to the proprietors of coal, it has been the means of leading the miners into more perilous workings, and the frequency of accident by explosion has in consequence not been diminished to the extent which was originally expected. The Davy lamp is a beautiful application of a scientific principle to effect a practical purpose, and with fair treatment its efficiency is indisputable; but where Davy lamps are entrusted to hundreds of men, and amongst them to many careless and reckless persons, it is impossible to guard entirely against gross negligence and its disastrous consequences. In coal-mines where the the most perfect system of ventilation prevails, and where proper regulations are, as far as practicable, enforced in regard to the use of Davy lamps, deplorable accidents do occasionally occur, and it is impossible at present to point out what additional precautions would secure immunity from such calamities. The only gleam of amelioration is in the fact that the loss of life in relation to the quantity of coal worked is on the decrease, from which we may infer that it is also on the decrease taken as a percentage on the number of miners employed.

The increase of the earth's temperature as we descend below the surface is a subject which has been discussed at previous meetings of the British Association. It possesses great scientific interest as affecting the computed thickness of the crust which covers the molten mass assumed to constitute the interior portions of the earth, and it is also of great practical importance as determining the depth at which it would be possible to pursue the working of coal and other minerals. The deepest coal mine in this district is the Monkwearmouth Colliery, which reaches a depth of 1,800 feet below the surface of the ground, and nearly as much below the level of the sea. The observed temperature of the strata at this depth agrees pretty closely with what has been ascertained in other localities, and shows that the increase takes place at the rate of 1° Fahr. to about 60 feet of depth. Assuming the temperature of subterranean fusion to be 3,000°, and that the increase of heat at greater depths continues uniform (which, however, is by no means certain), the thickness of the film which separates us from the fiery ocean beneath will be about thirty-four miles—a thickness which may be fairly represented by the skin of a peach taken in relation to the body of the fruit which it covers. The depth of 4,000 feet, which has been assumed as the limit at which coal could be worked, would probably be attended by an increase of heat exceeding the powers of human endurance. In the Monkwearmouth Colliery, which is less than half that depth, the temperature of the air in the workings is about 84° Fahr., which is considered to be nearly as high as is consistent with the great bodily exertion necessary in the operation of mining. The computations therefore of the duration of coal would probably require a considerable reduction in consequence of too great a depth being assumed as practicable.

At the last meeting of the British Association in this town, the importance of establishing an office for mining records was brought under the notice of the Council by Mr. Sopwith, and measures were taken which resulted in the formation of the present Mining Record Office. The British Association may congratulate itself upon having thus been instrumental in establishing an office in which plans of abandoned mines are preserved for the information of those who, at a future period, may be disposed to incur the expense of bringing those mines again into operation. But more than this is required. Many of the inferior seams of coal can be profitably worked only in conjunction with those of superior quality, and they will be entirely lost if neglected until the choicer beds be exhausted. Although coal is private property, its duration is a national question, and Government interference would be justified to enforce such modes of working as the national interests demand. But to enable Government to exercise any supervision and control, a complete mining survey of all our coal-fields should be made, and full plans, sections, and reports lodged at the Mining Record Office for the information of the legislature and of the public in general.

Before dismissing the subject of coal, it may be proper to notice the recent discovery by Berthelot of a new form of carburetted hydrogen possessing twice the illuminating power of ordinary coal-gas. Berthelot succeeded in procuring this gas by passing hydrogen between the carbon electrodes of a powerful battery. Dr. Odling has since shown that the same gas may be produced by mixing carbonic oxide with an equal volume of light carburetted hydrogen, and exposing the mixture in a porcelain tube to an intense heat. Still more recently, Mr. Siemens has detected the same gas in the highly heated regenerators of his furnaces, and there is now every reason to believe that the new gas will become practically available for illuminating purposes. Thus it is that discoveries which in the first instance interest the philosopher only, almost invariably initiate a rapid series of steps leading to results of great practical importance to mankind.

In the course of the preceding observations I have had

occasion to speak of the sun as the great source of motive power on our earth, and I must not omit to refer to recent discoveries connected with that most glorious body. Of all the results which science has produced within the last few years, none has been more unexpected than that by which we are enabled to test the materials of which the sun is made, and prove their identity, in part at least, with those of our planet. The spectrum experiments of Bunsen and Kirchhoff have not only shown all this, but they have also corroborated previous conjectures as to the luminous envelope of the sun. I have still to advert to Mr. Nasmyth's remarkable discovery, that the bright surface of the sun is composed of an aggregation of apparently solid forms, shaped like willow-leaves or some well-known forms of Diatomaceæ, and interlacing one another in every direction. The forms are so regular in size and shape as to have led to a suggestion from one of our profoundest philosophers of their being organisms, possibly even partaking of the nature of life, but at all events closely connected with the heating and vivifying influences of the sun. These mysterious objects, which, since Mr. Nasmyth discovered them, have been seen by other observers as well, are computed to be each not less than 1,000 miles in length, and about 100 miles in breadth. The enormous chasms in the sun's photosphere, to which we apply the diminutive term "spots," exhibit the extremities of these leaf-like bodies pointing inwards, and fringing the sides of the cavern far down into the abyss. Sometimes they form a sort of rope or bridge across the chasm, and appear to adhere to one another by lateral attraction. I can imagine nothing more deserving of the scrutiny of observers than these extraordinary forms. The sympathy also which appears to exist between forces operating in the sun and magnetic forces belonging to the earth, merits a continuance of that close attention which it has already received from the British Association, and of labours such as General Sabine has with so much ability and effect devoted to the elucidation of the subject. I may here notice that remarkable phenomenon which was seen by independent observers at two different places on the 1st of September, 1859. A sudden outburst of light, far exceeding the brightness of the sun's surface, was seen to take place, and sweep like a drifting cloud over a portion of the solar face. This was attended with magnetic disturbances of unusual intensity and with exhibitions of aurora of extraordinary brilliancy. The identical instant at which the effusion of light was observed was recorded by an abrupt and strongly marked deflection in the self-registering instruments at Kew. The phenomenon as seen was probably only part of what actually took place, for the magnetic storm in the midst of which it occurred commenced before and continued after the event. If conjecture be allowable in such a case, we may suppose that this remarkable event had some connection with the means by which the sun's heat is renovated. It is a reasonable supposition that the sun was at that time in the act of receiving a more than usual accession of new energy; and the theory which assigns the maintenance of its power to cosmical matter plunging into it with that prodigious velocity which gravitation would impress upon it as it approached to actual contact with the solar orb, would afford an explanation of this sudden exhibition of intensified light in harmony with the knowledge we have attained that arrested motion is represented by equivalent heat. Telescopic observations will probably add new facts to guide our judgment on this subject, and, taken in connexion with observations on terrestrial magnetism, may enlarge and correct our views respecting the nature of heat, light, and electricity. Much as we have yet to learn respecting these agencies, we know sufficient to infer that they cannot be transmitted from the sun to the earth except by communication from particle to particle of intervening matter. Not that I speak of particles in the sense of the atomist. Whatever our views may be of the nature of particles, we must conceive them as centres invested with surrounding forces. We have no evidence, either from our senses or otherwise, of these centres being occupied by solid cores of indivisible incompressible matter essentially distinct from force. Dr. Young has shown that even in so dense a body as water, these nuclei, if they exist at all, must be so small in relation to the intervening spaces, that a hundred men distributed at equal distances over the whole surface of England would represent their relative magnitude and distance. What, then, must be these relative dimensions in highly rarefied matter? But why encumber our conceptions of material forces by this unnecessary imagining of a central molecule? If we retain the forces and reject the molecule, we shall still have every property we can recognise in matter by the use of our senses or by the aid of our reason. Viewed in this light, matter is not merely a thing subject to force, but is itself composed and constituted force.

The dynamical theory of heat is probably the most important discovery of the present century. We now know that each Fahrenheit degree of temperature in a pound of water is equivalent to a weight of 772lbs. lifted 1ft. high, and that these amounts of heat and power are reciprocally convertible into one another. This theory of heat, with its numerical computation, is chiefly due to the labours of Mayer and Joule, though many other names, including those of Thomson and Rankine, are deservedly associated with its development. I speak of this discovery as one of the present age, because it has been established in our time; but if we search back for earlier conceptions of the identity of heat and motion, we shall find (as we always do in such cases) that similar ideas have been held before, though in a clouded and undemonstrated form. In the writings of Lord Bacon we find it stated that heat is to be regarded as motion and nothing else. In dilating upon this subject, that extraordinary man shows that he had grasped the true theory of heat to the utmost extent that was compatible with the state of knowledge existing in his time. Even Aristotle seems to have entertained the idea that motion was to be considered as the foundation not only of heat, but of all manifestations of matter; and, and for aught we know, still earlier thinkers may have held similar views.

The science of gunnery, to which I shall make but slight allusion on this occasion, is intimately connected with the dynamical theory of heat. When gunpowder is exploded in a cannon, the immediate effect of the affinities by which the materials of the powder are caused to enter into new combinations, is to liberate a force which first appears as heat, and then takes the form of mechanical power communicated in part to the shot and in part to the products of explosion which are also propelled from the gun. The mechanical force of the shot is reconverted into heat when the motion is arrested by striking an object, and this heat is divided between the shot and the object struck, in the proportion of the work done or damage inflicted upon each. These considerations recently led me, in conjunction with my friend Capt. Noble, to determine experimentally, by the heat elicited in the shot, the loss of effect due to its crushing when fired against iron plates. Joule's law, and the known velocity of the shot, enabled us to compute the number of dynamical units of heat representing the whole mechanical power in the projectile, and by ascertaining the number of units developed in it by impact, we arrived at the power which took effect upon the shot instead of the plate. These experiments showed an enormous absorption of power to be caused by the yielding nature of the materials of which projectiles are usually formed; but further experiments are required to complete the inquiry.

Whilst speaking of the subject of gunnery, I must pay a passing tribute of praise to that beautiful instrument invented and perfected by Major Navez, of the Belgian Artillery, for determining, by means of electro-magnetism, the velocity of projectiles. This instrument has been of great value in recent investigations, and there are questions affecting projectiles which we can only hope to solve

by its assistance. Experiments are still required to clear up several apparently anomalous effects in gunnery, and to determine the conditions most conducive to efficiency, both as regards attack and defence. It is gratifying to see our Government acting in accordance with the enlightened principles of the age by carrying on scientific experiments to arrive at knowledge which, in the arts of war as well as in those of peace, is proverbially recognised as the true source of human power.

Professor Tyndall's recent discoveries respecting the absorption and radiation of heat by vapours and permanent gases constitute important additions to our knowledge. The extreme delicacy of his experiments and the remarkable distinctness of their results render them beautiful examples of physical research. They are of great value as affording further illustrations of the vibratory actions in matter which constitute heat; but it is in connexion with the science of meteorology that they chiefly command our attention. From these experiments we learn that the minute quantity of water suspended as invisible vapour in the atmosphere acts as a warm clothing to the earth. The efficacy of this vapour in arresting heat is, in comparison with that of air, perfectly astounding. Although the atmosphere contains on an average but one particle of aqueous vapour to 200 of air, yet that single particle absorbs 80 times as much heat as the collective 200 particles of air. Remove, says Professor Tyndall, for a single summer night, the aqueous vapour from the air which overspreads this country, and you would assuredly destroy every plant incapable of bearing extreme cold. The warmth of our fields and gardens would pour itself unrequited into space, and the sun would rise upon an island held fast in the grip of frost. Many meteorological phenomena receive a feasible explanation from these investigations, which are probably destined to throw further light upon the functions of our atmosphere.

Few sciences have more practical value than meteorology, and there are few of which we as yet know so little. Nothing would contribute more to the saving of life and property, and to augmenting the general wealth of the world, than the ability to foresee with certainty impending changes of the weather. At present our means of doing so are extremely imperfect, but, such as they are, they have been employed with considerable effect by Admiral Fitzroy in warning mariners of the probable approach of storms. We may hope that so good an object may be effected with more unvarying success when we attain a better knowledge of the causes by which wind and rain, heat and cold, are determined. The balloon explorations conducted with so much intrepidity by Mr. Glaisher, under the auspices of the British Association, may perhaps in some degree assist in enlightening us upon these important subjects. We have learnt from Mr. Glaisher's observations that the decrease of temperature with elevation does not follow the law previously assumed of 1° in 300 feet, and that in fact it follows no definite law at all. Mr. Glaisher appears also to have ascertained the interesting fact that rain is only precipitated when cloud exists in a double layer. Raindrops, he has found, diminish in size with elevation, merging into wet mist and ultimately into dry fog. Mr. Glaisher met with snow for a mile in thickness below rain, which is at variance with our preconceived ideas. He has also rendered good service by testing the efficiency of various instruments at heights which cannot be visited without personal danger.

The facility now given to the transmission of intelligence and the interchange of thought, is one of the most remarkable features of the present age. Cheap and rapid postage to all parts of the world—paper and printing reduced to the lowest possible cost—electric telegraphs between nation and nation, town and town, and now even (thanks to the beautiful inventions of Professor Wheatstone) between house and house—all contribute to aid that commerce of ideas by which wealth and knowledge are augmented. But while so much facility is given to mental communication by new measures and new inventions, the fundamental art of expressing thought by written symbols remains as imperfect now as it has been for centuries past. It seems strange that while we actually possess a system of shorthand by which words can be recorded as rapidly as they can be spoken, we should persist in writing a slow and laborious longhand. It is intelligible that grown-up persons who have acquired the present conventional art of writing should be reluctant to incur the labour of mastering a better system; but there can be no reason why the rising generation should not be instructed in a method of writing more in accordance with the activity of mind which now prevails. Even without going so far as to adopt for ordinary use a complete system of stenography, which it is not easy to acquire, we might greatly abridge the time and labour of writing by the recognition of a few simple signs to express the syllables which are of most frequent occurrence in our language. Our words are in a great measure made up of such syllables as *com, con, tion, ing, able, ain, ent, est, ance*, &c. These we are now obliged to write out over and over again, as if time and labour expended in what may be termed visual speech were of no importance. Neither has our written character the advantage of distinctness to recommend it: it is only necessary to write such a word as "minimum" or "ammunition" to become aware of the want of sufficient difference between the letters we employ. I refrain from enlarging on this subject, because I conceive that it belongs to social more than to physical science, although the boundary which separates the two is sufficiently indistinct to permit of my alluding to it in the hope of procuring for it the attention which its importance deserves.

Another subject of a social character which demands our consideration is the much-debated question of weights and measures. Whatever difference of opinion there may be as to the comparative merits of decimal and duodecimal division, there can, at all events, be none as to the importance of assimilating the systems of measurement in different countries. Science suffers by the want of uniformity, because valuable observations made in one country are in a great measure lost to another from the labour required to convert a series of quantities into new denominations. International commerce is also impeded by the same cause, which is productive of constant inconvenience and frequent mistake. It is much to be regretted that two standards of measure so nearly alike as the English yard and the French metre should not be made absolutely identical. The metric system has already been adopted by other nations besides France, and is the only one which has any chance of becoming universal. We in England, therefore, have no alternative but to conform with France, if we desire general uniformity. The change might easily be introduced in scientific literature, and in that case it would probably extend itself by degrees amongst the commercial classes without much legislative pressure. Besides the advantage which would thus be gained in regard to uniformity, I am convinced that the adoption of the decimal division of the French scale would be attended with great convenience, both in science and in commerce. I can speak from personal experience of the superiority of decimal measurement in all cases where accuracy is required in mechanical construction. In the Elswick Works, as well as in some other large establishments of the same description, the inch is adopted as the unit, and all fractional parts are expressed in decimals. No difficulty has been experienced in habituating the workmen to the use of this method, and it has greatly contributed to precision of workmanship. The inch, however, is too small a unit, and it would be advantageous to substitute the metre if general concurrence could be obtained. As to our thermometric scale, it was originally founded in error; it is also most inconvenient in division, and ought at once to be abandoned in favour of the Centigrade scale. The recognition of the metric system and of the Centigrade scale by the numerous men of science composing the British Association, would be a most important step towards effecting that universal adoption of

the French standards in this country, which sooner or later will inevitably take place; and the Association, in its collective capacity, might take the lead in this good work, by excluding in future all other standards from their published proceedings.

The recent discovery of the source of the Nile by Captains Speke and Grant has solved a problem in geography which has been a subject of speculation from the earliest ages. It is an honour to England that this interesting discovery has been made by two of her sons, and the British Association, which is accustomed to value every addition to knowledge for its own sake, whether or not it be attended with any immediate utility, will at once appreciate the importance of the discovery, and the courage and devotion by which it has been accomplished. The Royal Geographical Society, under the able presidency of Sir Roderick Murchison, was chiefly instrumental in procuring the organisation of the expedition which has resulted in this great achievement, and the success of the Society's labours, in connexion with this and other cases of African exploration, shows how much good may be effected by associations for the promotion of scientific objects.

The science of organic life has of late years been making great and rapid strides, and it is gratifying to observe that researches, both in zoology and botany, are characterised in the present day by great accuracy and elaboration. Investigations patiently conducted, upon true inductive principles, cannot fail eventually to elicit the hidden laws which govern the animated world. Neither is there any lack of bold speculation contemporaneously with this painstaking spirit of inquiry. The remarkable work of Mr. Darwin, promulgating the doctrine of natural selection, has produced a profound sensation. The novelty of this ingenious theory, the eminence of its author, and his masterly treatment of the subject, have perhaps combined to excite more enthusiasm in its favour than is consistent with that dispassionate spirit which it is so necessary to preserve in the pursuit of truth. Mr. Darwin's views have not passed unchallenged, and the arguments both for and against have been urged with great vigour by the supporters and opponents of the theory. Where good reasons can be shown on both sides of a question, the truth is generally to be found between the two extremes. In the present instance we may without difficulty suppose it to have been part of the great scheme of creation that natural selection should be permitted to determine variations amounting even to specific differences where those differences were matters of degree; but when natural selection is adduced as a cause adequate to explain the production of a new organ not provided for in original creation, the hypothesis must appear, to common apprehensions, to be pushed beyond the limits of reasonable conjecture. The Darwinian theory, when fully enunciated, founds the pedigree of living nature upon the most elementary form of vitalised matter. One step further would carry us back, without greater violence to probability, to inorganic rudiments, and then we should be called upon to recognise in ourselves, and in the exquisite elaborations of the animal and vegetable kingdoms, the ultimate results of mere material forces left free to follow their own unguided tendencies. Surely our minds would in that case be more oppressed with a sense of the miraculous, than they now are in attributing the wondrous things around us to the creative hand of a great Presiding Intelligence.

The evidences bearing upon the antiquity of man have been recently produced in a collected and most logically-treated form by Sir Charles Lyell. It seems no longer possible to doubt that the human race has existed on the earth in a barbarian state for a period far exceeding the limit of historical record; but notwithstanding this great antiquity, the proofs still remain unaltered that man is the latest as well as the noblest work of God.

I will not run the risk of wearying this assembly by extending my remarks to other branches of science. In conclusion, I will express a hope that when the time again comes round to receive the British Association in this town, its members will find the interval to have been as fruitful as the corresponding period on which we now look back. The tendency of progress is to quicken progress, because every acquisition in science is so much vantage-ground for fresh attainment. We may expect, therefore, to increase our speed as we struggle forward; but however high we climb in the pursuit of knowledge, we shall still see heights above us, and the more we extend our view, the more conscious we shall be of the immensity which lies beyond.

TWIN SCREW STEAMERS.

It will be remembered that a Paper on this subject was read before the Society last session,* by Captain T. E. Symonds, R.N., in which the construction of these vessels was fully described. The *Times*, of Wednesday last, gives the following account of the trial of a vessel, called the *Aurora*, constructed on this principle:—

"The *Aurora* is an iron vessel, 165 ft. in length, with a beam of 23 ft., a depth of 13 ft. 6 in., an area of midship section of 150 square feet, and a displacement of 400 tons. Her engines have a collective nominal power of 120 horse, and drive two three-bladed screws, each independent of the other, 7 ft. in diameter, and with a pitch of 14 ft. 6 in. The cylinders have a diameter of 26 in., and a 21 in. stroke. The *Aurora* is a smart-looking vessel, with much finer lines forward and aft than were possessed by either of her predecessors. She carries two short masts, rigged for fore and aft canvas, and altogether, although "light as a bladder" on the water, has the appearance of a thorough steam "clipper." Her draught of water at starting yesterday was 7 ft. 3 in. aft, and 5 ft. 3 in. forward.

"A large party of gentlemen left town yesterday (Tuesday) morning for Tilbury station pier, along which the *Aurora* lay with her steam up. Immediately on the party embarking the screws were set to work in opposite directions, and the vessel slewed round with her head down river and started on her trial at 12·20 p.m., under the charge of Mr. Leigh, Trinity pilot, the wind being strong at S.W., and the tide half ebb. In running past the measured mile, in the Lower Hope, with the engines not up in their number of revolutions, she was timed and found to go over the ground in 4 min. 8 sec., giving the vessel a speed of 14·516 knots. At 1·30 p.m. the *Aurora* was approaching the Nore Light vessel, the engines averaging 120 revolutions, with 27lb. of steam and a vacuum of 25in., and every part working with the greatest possible smoothness. At 1·37 the Nore was passed, the distance from Tilbury, 20 nautical miles, having been done in 1 hour and 17 minutes, an almost unparalleled rate of speed, considering the vessel's horse-power of engine and hull displacement. From the Nore to the Mouse Light the vessel continued her course, the wind still fresh from the same quarter, and the movement of the water which necessarily accompanied it giving the vessel, from her light draught and hold upon the water, sufficient "roll" to detract from the efficient acting of her only just submerged screws. Notwithstanding this disadvantage, however, she ran past the "mile" on the Maplin Sands in 4 minutes 10 seconds, giving a speed of 14·400 knots, it being now about slack water, and the tide of little moment either way, and accomplished the distance to the Mouse Light at 2h. 5m. 22s., having been 28 minutes and 23 seconds from the Nore—eight nautical miles. During the latter part of the run down, a small jib had been set to steady the vessel, but no other help was given by the vessel's canvas to her engines in attaining this somewhat extraordinary rate of speed. From the Mouse the *Aurora* was run out between the Maplin and the Barrow as far as the Swin Light, passing the *James Dixon*, a fine screw collier under sail and full

* See present Vol. of *Journal*, p. 390.

steam, with her head in the same direction as the *Aurora's* on the way. On reaching the Swin, the vessel's head was brought round and laid homeward, it having been decided not to lengthen the trial by making circles, &c., owing to the high state of the wind, the light condition of the vessel, and the very satisfactory manner in which she had already turned both to port and starboard in answer to her rudder or screws, proving that she possessed the same facilities in that respect as were possessed by the *Flora*, *Hebe*, and *Kate*—a facility of manœuvring, in fact, which must necessarily be possessed by every vessel built for and fitted with double screws driven by independent engines. Southend was passed at 4h. 15m., and about two miles a-head was seen the *Sea Swallow*, one of the fastest paddle steamers on the Thames, plying between London, Southend, and Sheerness, and a hot chase naturally ensued, the *Aurora* eventually passing the clipper at 4h. 40m. in the midst of a heavy squall of wind and rain, and subsequently during the run up to Blackwall passing everything under steam she came across. Gravesend was passed at 5h. 15m., the engines making on the average at the time 127 revolutions, and Blackwall pier, the closing point of the *Aurora's* day's work, being reached in one hour and seven minutes, the distance being 20 miles. At Blackwall the numerous visitors on board disembarked, and returned to town by rail.

" Among the visitors on board were Vice-Admiral Sir George Sartorius; Capt. Symonds, R.N. (a strong advocate with the Admiralty for the adoption of the double screw principle in the Royal Navy for some time past); Captain Cuenskaw, the owner of the *Aurora*, destining her for the China trade; Mr. Russell, C.E.; Mr. Allen, R.N., of the *United Service Gazette;* and other gentlemen whose names are well known in the naval, scientific, and literary world.

" The principles of the adaptation of double screws to ships of war has been so far acknowledged in its importance by the Admiralty, that their lordships have given Messrs. Dudgeon an order to construct a small vessel which shall combine in their most efficient form the double-screw principle which they have so spiritedly and successfully brought into public notice."

PREVENTION OF STEAM BOILER EXPLOSIONS.

At the ordinary Monthly Meeting of the Executive Committee of the Manchester Association, on June 30th, 1863, Mr. L. E. Fletcher, chief engineer, presented his Monthly Report, of which the following is an abstract:—

During the past month there have been examined 340 engines—2 specially. 528 boilers—10 specially, 12 internally, 104 thoroughly, and 402 externally, in which the following defects have been found:—Fracture, 8 (2 dangerous); corrosion, 34 (3 dangerous); safety-valves out of order, 9; water-gauges ditto, 21; pressure-gauges, ditto, 9; feed apparatus, ditto, 2; blow-out apparatus, ditto, 35; fusible plugs, ditto, 13; furnaces out of shape, 4 (2 dangerous); over pressure, 2 (both dangerous); blistered plates, 3—total, 140 (9 dangerous). Boilers without glass water-gauges, 8; without pressure-gauges, 2; without blow-out apparatus, 13; without back pressure-valves, 39.

Explosions.

No. 10 Explosion:—The fact of this explosion having occurred, was stated in last month's report, but no detailed particulars had then been received. It has since been ascertained that the boiler was a plain cylindrical egg-ended one, externally fired, and that the explosion was caused by rents commencing at the seams over the furnace, which has so frequently been found to be the case in this class of boiler, and called attention to in these reports. Two other explosions of a very similar character have happened during this month, particulars of which are given.

Nine explosions have occurred during the last month, by which eleven persons have been killed, and twenty-one others injured. One of these explosions, which resulted from collapse of the flue, and by which no injury was done either to persons or surrounding property, occurred to a boiler under the inspection of this Association; while in the eight remaining cases not one of the boilers was under its care. Details will be found below.

The following is the monthly tabular statement:—

Tabular Statement of Explosions from May 23, 1863, to June 26, 1863, inclusive.

Index No.	Date.	General Description of Boiler.	Persons killed.	Persons injured.	Total.
No. 11.	May 29.	Locomotive	1	1	2
No. 12.	,, 30.	Cylindrical egg-ended Externally fired ...	5	12	17
No. 13.	June 2.	Upright furnace. Internally fired.........	0	0	0
No. 14.	,, 13.	Details not yet ascertained	1	5	6
No. 15.	,, 13.	Ordinary single flue, or "Cornish." Internally fired	0	0	0
No. 16.	,, 14.	Cylindrical egg-ended Externally fired ...	1	0	1
No. 17.	,, 15.	Details not yet ascertained	2	3	5
No. 18.	,, 15.	Marine	1	0	1
No. 19.	,, 26.	Details not yet ascertained	0	0	0
Total			11	21	32

No. 11 Explosion occurred to the boiler of a locomotive engine while running with a passenger train. Between fifty and sixty persons were injured and four killed. This result was not occasioned, however, by the explosion only, but principally by the train running off the line. Whether the engine leaving the rails was the cause or the effect of the explosion, is an interesting question, and one now undergoing strict investigation. All the facts likely to prove of value to steam users generally, which may be elicited with regard to this explosion, will be given to the members of the Association at the earliest opportunity after the close of the inquiry. The only injuries directly attributable to the explosion, are those which happened to the engine-driver and fireman, both of whom were severely scalded, the latter having died in consequence.

No. 12 Explosion, from which five persons were killed and twelve others injured, took place at an ironworks. The boiler in question was not under the care of this Association, was personally examined shortly after the explosion happened, and found to be of cylindrical egg-ended construction, having an internal flue of horseshoe-shape, both the inlet and outlet of which passed through the further end of the boiler, the remainder of the flue being quite independent of the shell, and thus not forming any longitudinal tie from front to back. The boiler was externally fired, the flame first passing underneath the shell, and then entering the flue at one end of the horse-shoe, and escaping to the chimney through the other. The length of the shell was twenty-eight feet, the diameter eight feet six inches, and the thickness of the plate seven-sixteenths, while the blowing-off pressure was about 40 lbs.

The boiler had rent completely into two parts at the fourth transverse seam from the front end, the larger portion of the shell flying forwards in a straight line from its seat, turning a summersault in its course, and landing in a position quite the reverse of its original one; the egg-end pointing to the brick work seating and the open one from it. The smaller portion had flown to a much greater distance than the other, and not, as is usually the case, in a direction immediately opposite, but at right angles to

it. A sister boiler working alongside, and connected to the one in question, was moved laterally, sufficiently so to disturb the brickwork seating and break the steam-pipes, though not to unseat it altogether.

With regard to the cause of the explosion:—The boiler was fifteen years old, the plates over the furnace had already been repaired, and it was stated that the seams at that part had been observed to be leaking only a quarter of an hour before the explosion took place; while, in addition, the shell was found to be patched in several places, and the plates cracked from the rivet holes to the edge. It is concluded, therefore, on consideration of all the circumstances, that the boiler could not have been in good condition, the correctness of which it is thought derives some corroboration from the fact, that the boiler alongside was found at the time of making this examination, to be also leaking at the seams over the furnace, and that considerably, although not under pressure. An examination of the fractures, as well as a consideration of the direction in which the parts had flown, led to the conclusion that the rent had commenced at a longitudinal seam of rivets, extending for some two or three plates over the furnace. The rent ran along as far as this longitudinal seam extended, and when met by a plate crossing it, or "breaking-joint," as it is termed, then developed into a transverse rent, and completely severed the shell in two. It is thought that the fact of this longitudinal rent in the furnace-end of the shell, being situated on one side of the centre, or "keel-line," accounts for that portion having been blown laterally, and that the upward direction which it had evidently taken, had caused the summersault of the remaining and larger portion. The explosion, therefore, is attributed to the imperfect condition of the boiler, and although such defects would not be dangerous in a suitably-constructed double-flued, or "Lancashire" boiler, which is always internally fired, they are generally found to be fatal in those boilers which are fired externally; while in the present case the effect was aggravated by the fact of the seams of rivets over the fire being in line, and the diameter of the shell being as much as eight feet six inches.

No. 13 Explosion, by which no one was injured or the surrounding property damaged, occurred to a boiler under the inspection of this Association, the particulars of which are as follows:—

The boiler was an upright furnace one, working in connection with two others of similar construction to itself. It was heated by the flames passing off from a furnace employed in preparing heavy forgings; the flames passing through an internal tube in the centre of the boiler, which ran directly from the top to the bottom. The extreme height of this internal flue was twenty-six feet two inches, but it was not of one diameter throughout. In order to admit of a brickwork lining to guard the flue above water line, the upper part was made of a larger diameter than the remainder, and attached to it by a flanged plate, which formed a "set-off," or shelf, on which the brickwork rested; again, the lower portion of the tube had a bell-mouth at the bottom, to afford an easy entrance for the flame. The length of the upper part was 11ft. 4in., and the diameter 3ft. 3in.; the length of the intermediate portion was 10ft. 4in., and the diameter 2ft. 6in.; while the length of the bell-mouth was 4ft. 6in., and the diameter at the base 3ft., the thickness of the plates being three-eighths of an inch throughout, and the blowing-off pressure 55 lbs.

The explosion, which did not in any way disturb the original position of the boiler, resulted from collapse of the internal flue tube, the collapse being confined to the intermediate portion just described, which it rent at about the middle of its length.

A tube of such small dimensions as those just given, namely, only 10ft. 6in. in length, and 2ft. 6in. in diameter, made of plate three-eighths in thickness, if of good material and workmanship as this one was, would be amply sufficient for a pressure of 55lbs., if working under ordinary circumstances. This would suggest the conclusion that the water supply had been allowed to run short, but no positive indications of the plates having been over-heated appeared upon examination, though this may, however, have taken place on previous occasions without its being known. On account of the height of these upright furnace boilers, the glass gauges became inaccessible, and the one in question was fitted with two gauge taps only, carried down by means of syphon pipes to within reach from the floor. Thus the water could sink below the proper level without affording any external indication, and would consequently pass unknown, should the gauge-taps be neglected. This may have happened without any immediate collapse of the tube taking place, although the flue would be materially weakened by it, and rendered liable to give way some time after in consequence. It is impossible to say whether the flue tube was getting out of shape or not, since the boiler had been in such constant work, that no opportunity was afforded the Association of making an "internal" and "thorough" examination for upwards of three years. This may not, therefore, be an improper time for calling attention to the importance generally, of having spare boilers, so that a suitable opportunity may be afforded for examination, as well as for cleaning and repair. The boiler was found to be heavily incrusted with hard scale, which must considerably have tended to the over-heating and weakening of the flue, to which these vertical boilers are always prone, from the tendency of the ascending steam to cling around the tube and prevent the contact of the water. The inaccessibility of the gauges and fittings of these vertical boilers, on account of their height, is another disadvantage connected with them, and, indeed, a thoroughly good and safe furnace boiler must still be considered as a desideratum.

No. 16 Explosion happened at an ironworks, to an externally-fired boiler 40ft. long, 8ft. in diameter, made of plates seven-sixteenths of an inch thick. The shell of the boiler gave way immediately over the furnace, the fireman being scalded to death from the stream of hot water issuing from the rent. The boiler had been repaired at this part, by putting on a new plate two months previous to explosion, and it was at this plate that the rent occurred.

This boiler, which was not under the charge of this Association, was not personally examined on the occurrence of the explosion, but an engineer who inspected it shortly after, has kindly furnished the following particulars:—The plate ripped open through the solid metal in two places, the rents being about fifteen inches long and one inch wide, while the parts surrounding it were a good deal cracked and the seams patched, so that the bottom of the boiler was evidently in a very defective state. The ruptured plate was about seven-sixteenths of an inch thick, and did not appear of very good quality, as if not thoroughly welded in rolling; but the fractures were not, properly speaking, "blisters," since the whole thickness of the plate had come down at once. In addition to the inferior character of the plate, the boiler was heavily coated with incrustation, and this had accumulated at the bottom for a depth of three inches just over the fracture, and extended for a space of four feet by two feet. This mud had hardened so much that the water and steam ploughed but a small hole through it in rushing out. There can be little question that this coating of mud had kept the water away from the plate, and thus led to its becoming overheated, from which it gave way. There was plenty of water in the boiler at the time of the rupture.

It will be clear that it is scarcely possible for such a cake of sediment to have formed upon the furnace crown of an internally-fired boiler, and also that an efficient blowing-out apparatus would have prevented the accumulation in a great measure, if not altogether, and thus that the explosion was due to the dangerous character common to all externally-fired boilers, coupled in this case with neglect.

EXAMINATION PAPERS, 1863.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(*Continued from page 630.*)

ENGLISH HISTORY.

THREE HOURS ALLOWED.

1. Give, with dates, a short life of King Alfred?
2. What were the principal changes introduced into England by the Norman Conquest?
3. State the chief facts in the reigns of John, Henry III., and Edward I., that bear upon the growth of the English Parliament.
4. Explain the respective pretensions of Balliol and Bruce to the crown of Scotland, and state what claim was advanced by Edward I. when he was made umpire?
5. What were the chief causes of the wars of the Roses?
6. Give, with dates, a short outline of Queen Elizabeth's reign.
7. What were the grievances for which the Commons demanded redress in the Petition of Right?
8. Give a short account of the Habeas Corpus Act, and say whether it is to be regarded as a confirmation of old rights, or as a grant of new privileges.
9. On what grounds did our North American colonies rebel against the British Crown, and what were the first incidents of the rebellion?
10. Give a short account of the campaign of Lord Cornwallis in 1781.
11. Give the names of the states that finally established their independence, and notice briefly by whom and when they weie settled.
12. Write a short life of the Black Prince, of Sir Walter Raleigh, or of Lord Nelson.
13. Describe the battle of Poictiers, of Towton, or of Edgehill.
14. Enumerate the chief English possessions in 1863.

ENGLISH LITERATURE.

THREE HOURS ALLOWED FOR THE TWO AUTHORS SELECTED BY THE CANDIDATE.

Chaucer.

The Knight's Tale.

I.

(a) Wost though nat well the old clerkes sawe,
That who schal geve a lover eny lawe,
Love is a grettere lawe, by my pan,
Then may be geve to eny earthly man?
Therefore posityf lawe, and such decre,
Is broke away for love in ech degree.

(b) The busy larke, messager of daye,
Salueth in hire song the morwe gray;
And fyry Phebus ryseth up so bright,
That all the orient laugheth of the light,
And with his stremes dryeth in the greves
The silver dropes, hongying on the leeves.

(c) Ther saugh I furst the derk ymaginyng
Of felony, and al the compassyng;
The cruel ire, as reed as eny gleede;
The pikepurs, and eek the pale drede;
The smyler with the knyf under his cloke;
The schipne brennyng with the blake smoke;
The tresoun of the murtheryng in the bed;
The open werres, with woundes al bi-bled;
Contek with bloody knyf, and sharp manace.
Al ful of chirkyng was that sorry place.

(d) The firste moevere of the cause above,
Whan he firste made the fayre cheyne of love,
Gret was theffect, and heigh was his entente;
Wel wist he why, and what thereof he mente;
For with that fayre cheyne of love he bond
The fyr, the water, the eyr, and eek the lond
In certeyn boundes, that they may not flee—

1. State the connexion in which each of the above passages occurs.
2. Turn the first two of them into modern English.
3. Explain the allusions, obsolete words, and peculiar constructions.
4. What words must be pronounced differently from modern usage in order to bring the verse within the laws of metre?

II.

1. From what sources did Chaucer take the story of Palamon and Arcite?
2. Sketch the story very briefly.
3. Give some account of Chaucer's visit to Italy.
4. Name Chaucer's principal works, in prose and verse.
5. Who were the most distinguished of Chaucer's contemporaries?

Shakspere.

Macbeth; Julius Cæsar; As You Like It.

I.

1. [1] He that's coming
Must be provided for: and you shall put
This night's great business into my despatch;
Which shall to all our nights and days to come
Give solely sovereign sway and masterdom.

[2] Then is there mirth in Heaven
When earthly things made even
Atone together.

[3] This tyrant, whose sole name blisters our tongues,
Was once thought honest; you have loved him well;
He hath not touched you yet. I am young, but something
You may deserve of him through me.

[4] A good and virtuous nature may recoil
In an imperial charge.

[5] But, poor old man, thou prun'st a rotten tree,
That cannot so much as a blossom yield,
In lieu of all thy pains and husbandry.

[6] Being unprepared,
Our will became the servant of defect;
Which else should free have wrought.

(a) In what connexion does each of the above passages occur?
(b) Give the sense of each of them in simple prose.
(c) Notice every word which is used in an obsolete or unusual sense, and every peculiar construction.

2. [1] You know that I held Epicurus strong,
And his opinion: now I change my mind,
And partly credit things that do presage.

[2] ——witchcraft celebrates
Pale Hecate's offerings; and withered murther,
Alarum'd by his sentinel, the wolf,
Whose howl's his watch, thus with his stealthy pace,
With Tarquin's ravishing strides towards his design
Moves like a ghost.

(a) In what connexions do the above passages occur?
(b) Explain the allusions.
(c) Notice the peculiar constructions and uses of words.

3. Explain these expressions:—

[1] You'll be whipped for taxation.
[2] You ought not walk.
[3] You are the first that rears your hand.
[4] As lief not be.
[5] It irks me.
[6] Out of suits.

II.

1. Into what classes are the plays of Shakspere divided? To which class does each of the three plays belong?

2. Give some account of the sources from whence the plot of each of these plays was taken. Notice the principal deviations from the original narratives which Shakspere has made in Julius Cæsar and Macbeth.

3. Sketch the third act of Julius Cæsar. Compare the characters of Casca and Cassius.

4. Describe the character of Banquo.

5. Give some account of the early editions of Shakspere's plays.

Milton.

Paradise Lost; Books I. to VI.

I.

1. Thus they their doubtful consultations dark
Ended, rejoicing in their matchless chief:
As when from mountain tops the dusky clouds
Ascending, while the north wind sleeps, o'erspread
Heaven's cheerful face, the lowring element
Scowls o'er the darkened landskip snow, or shower;
If chance the radiant sun with farewell sweet
Extend his evening beam, the fields revive,
The birds their notes renew, and bleating herds
Attest their joy, that hill and valley rings.

(a) Express the sense of the above passage in simple prose.

(b) Explain all peculiar constructions and words employed in unusual senses.

2. [1] Blind Thamyris and blind Mœonides,
And Tiresias and Phineus, prophets old.
[2] From hence no cloud, or, to obstruct his sight,
Star interposed, however small, he sees,
Not unconform to other shining globes,
Earth and the garden of God, with cedars crowned
Above all hills: as when by night the glass
Of Galileo, less assured, observes
Imagined lands and regions in the moon:
Or pilot, from among the Cyclades
Delos or Samos first appearing, kens
A cloudy spot.
[3] Eden stretched her line
From Auran eastward to the royal towers
Of great Seleucia, built by Grecian kings—
[4] As when to them who sail
Beyond the Cape of Hope, and now are passed
Mozambic, off at sea north-east winds blow
Sabæan odours from the spicy shore
Of Araby the blest.

(a) State the connexion in which each of these passages occurs.

(b) Explain the allusions.

(c) Explain every obscurity arising from peculiar construction, peculiar arrangement, and words employed in unusual senses.

3. Give the meaning of the following expressions:—
Ethereal quintessence.
When Zephyrus on Flora breathes.
Speed succinct.
A boggy Syrtis.
Aurora's fan.
Maia's son.
Anarch—Tartarus—Arreed—Ambrosia.

4. What is to be noticed in the grammar of these passages?

[1] But cloud instead and ever during dark
Surrounds me.
[2] Ten thousand fathom deep.
[3] Than whom none higher sat.
[4] Before the heavens thou wert.
[5] Grinned horrible a ghastly smile.
[6] If thou beest he.

II.

1. To what portions of the Old and New Testaments was Milton most indebted for the outline of Paradise Lost?

2. What references are there in the first six books to the great controversies of Milton's day?

3. Quote some of the passages in which there is allusion made to the poet's personal history.

4. Sketch Milton's early life up to his first marriage. Give a list of his most important prose works.

Addison.

The Spectator, Vol. VIII.

I.

1. "To return, therefore, to my first thought, I could not but look upon myself with secret horror as a being that was not worth the smallest regard of one who had so great a work under his care and superintendency."

In what connexion does this passage occur? What are the main lines of thought by which the Spectator and one of his contributors in a later paper, correct the suggestion?

2. "I like the story of the honest Dutchman, who, upon breaking his leg by a fall from the mainmast, told the standers-by it was a great mercy it was not his neck."

What use does the Spectator make of this story?

3. Briefly sketch the story of Fadlallah. To illustrate what truth is it introduced?

4. What is the meaning of the story of Hilpa and Shalum?

5. "It must be owned that fear is a very powerful passion, since it is esteemed one of the greatest of virtues to subdue it."

How does the Spectator carry on this argument?

6. "A grotto so complete, with such design,
What hands, Calypso, could have formed but thine
Each checkered pebble, and each shining shell,
So well proportioned, and disposed so well,
Surprising lustre from thy thought receive,
Assuming beauties more than nature gave.
To her their various shapes and glossy hue,
Their curious symmetry they owe to you.
Not famed Amphion's lute, whose powerful call
Made willing stones dance to the Theban wall,
In more harmonious ranks could make them fall."

(a) In what connexion does this passage occur?
Give the sense of it in plain prose.
Explain the allusions and peculiar expressions.

II.

1. State the circumstances which occasioned the composition of the eighth volume of the Spectator. Name the principal contributors.

2. What are the characteristic qualities of Addison as an essayist?

3. Sketch the life of Addison. Give the titles of his chief works in prose and poetry.

Angus.

Handbook of the English Tongue. Chapters I. to VI.

1. From what languages does the English derive its chief elements? In what proportion does each of these languages contribute to our stock of words?

2. State the most important rules for detecting Anglo-Saxon words based on their meanings.

3. How are the English words derived from Latin classified historically? Give examples of each class.

4. What are the principal dialects of the old French language? Give some account of the one of them with which the study of English is most concerned.

5. How are the English words of Keltic origin classified? Give examples of each class.

6. "Etymology is not always a safe guide to the meaning of words." Explain this remark, and illustrate it by examples.

7. Into what periods is the history of the English language usually divided? State some of the characteristic peculiarities of the earlier periods. Name a few authors belonging to each.

8. Classify the Gothic languages.

9. Give the origins of the following words:—Avalanche, Meagre, Lieutenant, Friar, Esquire, Balance, Raisin, Toilette, Usher, Soldier, Tissue, Poison.

10. From what languages are the following words taken? Admiral, Zero, Gong, Amen, Basket, Sofa, Algebra, Scimetar, Mop, Scarlet, Bandit, Lilac, Gravel, Potato, Yacht.

Tennyson.

Idylls of the King.—In Memoriam.

I.

1. [1] O purblind race of miserable men,
How many among us at this very hour
Do forge a life-long trouble for ourselves,
By taking true for false, or false for true;
Here, through the feeble twilight of this world
Groping, how many, until we pass and reach
That other, where we see as we are seen!

[2] But when the Prince had brought his errant eyes
Home from the rock, sideways he let them glance
At Enid, where she droopt: his own false doom,
That shadow of mistrust should never cross
Betwixt them, came upon him, and he sighed;
Then with another humourous ruth remarked
The lusty mowers labouring dinnerless,
And watched the sun blaze on the turning scythe
And after nodded sleepily in the heat.

(a) Give the sense of each of the above passages in simple prose.

(b) Notice every word used in an unusual sense.

2. What is the substance of Enid's song? How is it connected with her character and history?

3. Sketch the story of Elaine.

4. Trace the gradual development of Guinevere's guilt in the notices of her which occur in the first three of the Idylls.

5. Compare the character of King Arthur with that of Geraint.

6. With what purpose is reference made to the raising of Lazarus in In Memoriam?

7. [1] 'Tis better to have loved and lost
Than never to have loved at all.

[2] But for the unquiet heart and brain,
A use in measured language lies;
The sad mechanic exercise,
Like dull narcotics numbing pain.

And what delights can equal those
That stir the spirit's inner deeps,
When one that loves but knows not, reaps
A truth from one that loves and knows?

[4] O last regret, regret can die!
No—mixt with all this mystic frame,
Her deep relations are the same,
But with long use her tears are dry.

(a) In what connexions do these passages occur?

Put the thoughts expressed in them into simple prose.

II.

1. What is the meaning of the word Idyll?

2. Give an account of the sources from which the stories of the Idylls are taken.

3. Which do you prefer of the four Idylls? State the grounds of your preference.

4. What series of poems is considered to have a resemblance to In Memoriam, regarded as an expression of human feeling? What are the chief points of likeness and unlikeness which strike you in making the comparison? Do you think that Tennyson's work was suggested by the older one?

5. What facts of personal history can be gathered from In Memoriam which throw light on the occasion of its composition?

6. What are the principal faults which have been found with In Memoriam? In which of these alleged faults does it stand in remarkable contrast to the Idylls? Do you consider that the faults are justly urged? If not, on what grounds do you defend the work.

Pope.

Essay on Man—Essay on Criticism—The Rape of the Lock.

I.

1. [1] Who noble ends by noble means obtains,
Or, failing, smiles in exile or in chains,
Like good Aurelius let him reign, or bleed
Like Socrates, that man is great indeed.

[2] Our school divines this zealous isle o'er spread;
Who knew most sentences, was deepest read:
Faith, gospel, all, seemed made to be disputed,
And none had sense enough to be confuted:
Scotists and Thomists, now in peace remain,
Amidst their kindred cobwebs in Duck-lane.

[3] Close by those meads, for ever crown'd with flowers,
Where Thames with pride surveys his rising towers,
There stands a structure of majestic frame,
Which from the neighbouring Hampton takes its name.

[4] The mighty Stagyrite first left the shore,
Spread all his sails, and durst the deeps explore;
He steer'd securely, and discovered far,
Led by the light of the Mæonian star.
Poets, a race long unconfined and free,
Still fond and proud of savage liberty,
Received his laws; and stood convinced 'twas fit
Who conquered nature should preside o'er wit.

(a) In what connexion does each of the above passages occur?

(b) Express the sense of the second and fourth passages in simple prose.

(c) Explain the allusions.

(d) Notice the peculiarities in the grammar and in the use of particular words.

2. A little learning is a dangerous thing!
Drink deep or taste not the Pierian spring;
There shallow draughts intoxicate the brain,
And drinking largely sobers us again.

(a) What is meant by the Pierian spring?

(b) Do you entirely agree with the poet? Give the reasons of your answer.

II.

1. Give a sketch of the argument of the Essay on Criticism.

2. What do you consider to be the unsound parts of the reasoning in the Essay on Man?

3. What was the incident which occasioned the composition of the Rape of the Lock? Give some account of the source from whence Pope took the machinery of the poem.

4. Sketch the life of Pope. Name some of his most famous contemporaries. Give a list of his principal works.

(To be continued.)

Proceedings of Institutions.

LIVERPOOL INSTITUTE.—The thirty-eighth annual report says that the receipts during the year have amounted to £6,365 3s. 6d., and the payments to £6,333 0s. 10d. On December 31st, the balance in hand was £1,661. The payments include extraordinary expenditure, incurred during the year in connection with the changes which have attended the death of the late head of the day schools, and the appointment of his successor, in altering and improving several of the class rooms, flagging one of the yards, providing new class-books, apparatus, and furniture, and otherwise in aid of the teaching, and to promote the comfort of the pupils. The total number of members, subscribers, and pupils, at the end of the year, was 2,498, being an increase of 20 over the preceding year. The High and Commercial Schools have now been nearly a year under the present head master, the Rev. Mr. Jones, who has fully justified the confidence with which the directors committed these great schools to his charge. The important measures which, before his election, the directors had adopted for improving the education given in the schools, have been carried into effect by him in such manner as to attain the advantages which were hoped for therefrom. The distinguished success of the pupils in the local examinations of Oxford and Cambridge affords gratifying proof of the excellence of the instruction given in the schools, and of their efficient management. Fourteen candidates entered for the Oxford Examination, of whom thirteen passed. Three passed among the seniors —two in the first and one in the second class. Two juniors also passed in the first class, making in all four in the first class; while of all other schools in the kingdom which competed only two obtained as many as four "first classes;" and only one school besides this so many as two "senior first classes." The per-centage of failures in the country was nearly one-half, and in these schools only one out of fourteen. The per-centage of "first classes" taken throughout the country was only eight, and in these schools thirty-one. Greater encouragement has of late been given in the High School to the study of the classics, so far as to secure the advantages they afford in a liberal scheme of modern education, without in any degree diminishing that attention to science and the requirements of a commercial life for which these schools have long been distinguished. The directors have added to the High School a Preparatory Department, which was opened in October. It commenced with eleven pupils, and now contains thirty. Mrs. Holt, the widow of that warm friend and zealous director of the Institute, the late Geo. Holt, Esq., has invested the sum of £1,000 to found a scholarship in the Institute, to be called the "Holt Scholarship." It will be awarded, whenever vacant, to the best boy in the High School. The trustees of the fund will have large powers of varying the application of it, in order to secure that it shall not fail of usefulness hereafter, through too strict limitation. The number of pupils at the close of the year was as follows:—High School, 110; Commercial School, 631; total, 741. The High School now contains 138 pupils, and the Commercial School 643; total, 781, being an increase of 40 over last quarter. The finances of the girls' school are in a most satisfactory state, and its management reflects high credit on Miss Ellison, who is at its head, as well as upon her assistants. The total receipts have amounted to £1,836 16s. 10d., and the payments to £1,713 0s. 8d., showing a surplus of £123 16s. 2d., and increasing the balance to the credit of the school to £1,321 19s. 6d. During the last two years the attendance in the evening school has decreased. This falling off has taken place chiefly in the elementary section of the school, and is doubtless due to causes which leave no room for regret among the friends of popular education. The number of pupils at the close of the year was 430. The sum of £30 has been presented to the directors by the Committee of the Holt Testimonial Fund, accompanied with a suggestion that it should be placed in the hands of trustees, and the interest appropriated to the giving of prizes in the evening school. A course of public lectures on "Political Economy" was delivered in the Institute by the President, J. T. Danson, Esq., early in the year, in accordance with the announcement made at the last annual meeting. Afterwards the President gave weekly class lectures thereon in the evening school, and roused great interest in the subject. The directors have learned with pleasure that he has recently re-opened this class, which is not confined to regular pupils of the evening school, all persons being admissible who desire instruction in the science. The first of the public lectures, having a wide general application, has been published by the directors. The class-book adopted is the "Progressive Lessons in Social Science" of Mr. William Ellis; and of this work the author has, in testimony of the interest with which he watches the experiment, presented to the Institute three dozen copies. During the year the number of students attending the Central School of Art has increased. The usual annual examination was held at the school by her Majesty's Art Inspector, and the following prizes and honours have been awarded to the students, viz:—

National Medallions ...	2	Second Grade Prizes...	19
Ditto, Hon. Mention...	1	Ditto, Passes............	55
Local Medals............	22	First Grade Prizes......	92
Ditto, Hon. Mention...	3	Ditto, Passes............	116
Prize Studentships......	7		
		Total	310

being an increase of 124 over the preceding year. Works executed by two of the students of this school, viz., Miss Pow and Mr. Birkmyer (now the master of the Exeter School of Art), were placed by the Science and Art Department in the International Exhibition, to illustrate, in its highest results, the instruction in applied art given in the Government Schools of Art of this country. It is gratifying to the directors to report a considerable increase of the number of students at the Queen's College. The number in attendance at the close of the year was 180, showing an increase of 50 per cent. A provincial matriculation examination of the University of London was again held at the College in July, under the Rev. Professor Newth, M.A., the delegate appointed by the University. The want of additional accommodation led the directors to inquire into the present utility of the museum. They found that it no longer serves any educational purpose which will not be better served by distributing the more useful specimens in the class rooms where the subjects they illustrate are taught; and, satisfied that there no longer exist good reasons for the maintenance of the museum as hitherto, they have resolved to convert the space it occupies into class rooms.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette*, *August* 21*st*, 1863.]

Dated 16*th July*, 1863.

1778. H. Mège, 4, South-street, Finsbury—Certain imp. in the mode of treating fatty bodies.

Dated 21*st July*, 1863.

1821. C. H. Roeckner, Richmond-terrace, Clapham-road—Imp. in machinery and process for reducing wood to a fibrous condition for the manufacture of paper stuff or pulp.

Dated 30*th July*, 1863.

1884. J. W. Branford, March, Cambridgeshire—An improved agricultural implement for hoeing and cleaning the land, and for cutting or setting out the plants of root crops at certain distances from each other.

1889. G. Smith, jun., 230, King's-road, Chelsea—Imp. in buffing and traction apparatus of railway carriages and waggons.

Dated 31*st July*, 1863.

1897. B. Johnson, Church-street, Camberwell-green—Imp. in pianofortes.

1899. A. R. Arrott, Saint Helen's, Lancashire—Imp. in bleaching certain vegetable fibres used for textile or other purposes, whether in the raw state or manufactured.

Dated 1st August, 1863.

1907. T. Bradshaw, Bolton, Lancashire—Certain imp. in machinery or apparatus for giving motion to "Dobby horses," flying and swinging boats, or similar apparatus used for public amusement.
1908. R. E. Bibby, Manchester—An improved fire proof cement which may be employed for covering walls, ceilings, and floors, and is also applicable in the manufacture of fire bricks, crucibles, retorts, melting pots, and for other purposes where fire-resisting properties are required.

Dated 3rd August, 1863.

1914. B. W. Gerland, Macclesfield—Imp. in the manufacture of size, glue, and phosphates.
1915. J. I. P. Bonnet and J. Pfister, 7, Rue Thévenot, Paris—Imp. in lamps.

Dated 4th August, 1863.

1923. J. H. Walsh, Kensington—Imp. in breech-loading fire-arms, and in the means of extracting cartridge cases therefrom.

Dated 5th August, 1863.

1928. E. A. Cowper, 35A, Great George-street, Westminster—Imp. in furnaces for heating air, steam, and other elastic fluids.
1930. G. Wilkins, Birmingham—An improved means of railway signalling.
1933. W. Hodson, Hull—Imp. in machinery used for propelling carriages and vessels.

Dated 6th August, 1863.

1935. G. Gowland, Liverpool—Imp. in mariners' compasses.
1936. C. Lowe, Bradford-street, South Bradford, near Manchester—Imp. in dyeing and printing.
1939. W. P. Hodgson, Hylton, near Sunderland, and J. V. Woodifield, Hope-street Foundry, Sunderland—Imp. in machinery for the manufacture of rivets.
1941. J. Young, Bucklersbury—Imp. in the preservation of animal matter.
1944. G. E. Charageat, 89, Chancery-lane—Imp. in the construction of frames for umbrellas and parasols.
1945. E. E. Quelle, Bermondsey—Imp. in inkstands.

Dated 7th August, 1863.

1949. W. Jones, Warrington, Lancashire—Certain imp. in steam boilers.
1951. A. V. Newton, 66, Chancery-lane—An imp. in the manufacture of shuttles. (A com.)
1952. J. W. Slater, Huddersfield—Imp. in the production of yellow and orange colouring matters.
1953. J. H. Johnson, 47, Lincoln's inn-fields—Imp. in apparatus for preventing sea sickness. (A com.)
1954. R. A. Brooman, 166, Fleet-street—Imp. in coke ovens. (A com.)
1955. E. Watson, King-street—An improved apparatus whereby screw propellers may be made to steer as well as propel, applicable also as an improved ball and socket joint.
1956. J. Platt, 10, Charlotte-street, Bloomsbury—Imp. in apparatus for supplying steam boilers with water.
1957. T. W. Guillod, 15, Park-place-terrace, Paddington—Imp. in the manufacture of chess boards and chess men.
1958. E. Morewood, Stratford, Essex—Imp. in coating metals.
1959. J. Thompson, E. G. Fitton, and F. A. Fitton, Ardwick, Lancashire—Imp. in engines for carding cotton and other fibrous materials.

Dated 8th August, 1863.

1960. N. Jarvie and W. Miller, Glasgow—Imp. in the manufacture of oakum, and in apparatus therefor.
1961. W. B. Robins, Harborne, Staffordshire—A new or improved instrument or apparatus for extinguishing fires.
1962. J. Thornton, J. Thornton, A. Thornton, and W. Thornton, Nottingham—Imp. in apparatus used for producing looped fabrics.
1963. A. P. Price, 47, Lincoln's-inn-fields—Imp. in the application of india-rubber and gutta-percha to the manufacture of brushes and mats. (A com.)
1964. H. R. Brown, Cranbourne-street—New or improved apparatus for the regulated delivery of cards, tickets, labels, bills, and sheets or pieces of cardboard, paper, metal, or other material for advertising or other purposes.
1965. M. Smith, 71, Fleet-street—Imp. in obtaining farinaceous material from potatoes.
1966. J. W. Armstrong, Carmarthen—Imp. in fastening and in securing in position the rails of railways, the said fastening being applicable for other uses.

Dated 10th August, 1863.

1969. B. Heyne, jun., Chester—Improved apparatus to facilitate sketching and drawing landscapes, buildings, machinery, and other objects in correct perspective.
1970. R. Dickson, London-wall—Imp. in lithographic printing presses.
1972. A. V. Newton, 66, Chancery-lane—An improved manufacture of blue and of violet colouring matter. (A com.)

Dated 11th August, 1863.

1973. J. Robson, jun., South Shields—Imp. in money tills.
1974. E. S. Simon, 10, Bury-street—An improved fastening for leggings.
1976. W. Knowles and R. Halliwell, Bolton, Lancashire—Certain imp. in machinery for preparing, spinning, and doubling cotton and other fibrous substances.
1977. D. W. Barker, Anderlecht, near Brussels—Imp. in means o apparatus for actuating rotary shuttle boxes.
1978. J. T. King, Liverpool—Imp. in apparatus for containing and distributing gas for lighting railway carriages, steam boats, and other moveable vehicles and vessels, railway stations, and other places, parts of such apparatus being suitable for governing the supply of gas and air for various purposes.
1979. W. B. Haigh, Oldham—An improved equilibrium saw frame.
1980. A. V. Newton, 66, Chancery-lane—An improved process for hardening cast iron. (A com.)
1981. J. G. Willans, Westbourne-grove-terrace—Imp. in the manufacture of iron.
1982. W. Clark, 53, Chancery-lane—Imp. in road sweeping machines. (A com.)
1983. J. Wheeler, 23, Poultry—Imp. in the perfuming of gloves.
1984. W. Gray, Brownrigg, Haddington, N.B.—Imp. in certain parts of reaping machines, and in the working or application of the same.
1985. Sir J. S. Lillie, 105, Pall-mall—An improved revolving battery.

Dated 12th August, 1863.

1986. G. Graham, Dumbarton, N.B.—Imp. relating to baths or boilers used in dyeing.
1987. R. Mushet, Coleford—An imp. or imps. in the manufacture of cast steel.
1988. J. Cornforth and A. Andrews, Birmingham—Imp. in the nails commonly called screw rivets, which improvements are also applicable to other nails and spikes.
1990. R. Canham, Clerkenwell—Imp. in machines for the preparation of moulds for casting.
1991. J. Templeman, Glasgow—Imp. in the manufacture or production of artificial fuel.
1992. R. S. Newall, Gateshead—An improved mode of and apparatus for drying chemical compounds and other substances.
1994. W. Hudson, C. Catlow, and J. Dodgeon, Burnley, Lancashire—Imp. in looms for weaving.
1996. W. Clark, 53, Chancery-lane—An improved lamp for burning coal oil and other similar hydro-carbons without the aid of a draught chimney. (A com.)

Inventions with Complete Specifications Filed.

2009. S. R. Wilmot, Exeter—Imp. in hand trucks. (A com.)—14th August, 1863.
2020. P. F. L. B. Hirn, Le Cateau (Nord), France—A waterproof preparation to make fabrics, thread, textile matters, and others impenetrable against water.—15th August, 1863.

Patents Sealed.

[*From Gazette, August 21st*, 1863.]

21st August.

471. C. Malpas.
473. H. Kilshaw and T. Elce, jun.
474. F. J. Manceaux.
475. E. T. Hughes.
488. R. A. Brooman.
490. J. D. Welch and A. P. Welch.
491. R. Martindale.
492. T. R. Harding.
493. T. Dickins, A. L. Dickins, and H. Heywood.
494. J. Tatham.
498. W. Whitehead, H. Whitehead, and H. Barber.
500. J. Hawthorn.
503. J. W. Burton.
505. W. Hooper.
507. E. R. Walker.
510. A. Junger.
519. R. A. Brooman.
524. B. Lawrence and W. Niblett.
527. H. H. Henson.
531. N. Thompson.
533. A. Macivor.
534. G. Tomkins.
537. C. Ritchie.
539. W. A. Wilson and J. Smith.
541. A. P. Price.
542. J. Yates.
547. R. J. Nodder.
549. J. H. Albinson and H. H. Cocker.
550. W. Staufen.
552. E. T. Hughes.
553. J. Carver.
554. J. A. Coffey.
557. A. Dudgeon, G. F. L. Meakin, and E. E. Allen.
560. V. D. Delahaye.
564. W. Hadfield.
568. S. Williamson.
570. E. Paine.
571. T. E. Symonds.
574. E. Hayes.
575. S. Bateman.
585. J. S. Wells.
593. J. Henderson.
599. B. S. Cohen.
611. W. Clark.
617. J. Clinton.
639. D. W. Ransom.
661. A. Barclay.
669. A. Barclay.
694. J. Tangye.
797. J. Norton.
886. T. Gray.
1252. F. Fenton.
1409. A. J. Hollingsworth.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, August 25th*, 1863.]

18th August.

2016. M. Jacoby.

19th August.

2033. J. H. C. Lacroisade.
2039. S. Greenwood.

20th August.

2038. A. Halter and F. Decorce.
2053. A. V. Newton.

21st August.

2051. J. Wilkes, T. Wilkes, and G. Wilkes.
2144. G. Bedson.
2228. P. Pautard.

22nd August.

2043. F. P. J. Van den Ouwelant.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, August 25th*, 1863.]

17th August.

1952. J. Crossley.

22nd August.

2046. E. P. Spiller.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 4, 1863.

NOTICE TO INSTITUTIONS.

The Programme of the Examinations for 1864 is now ready, and may be had *gratis*, on application to the Secretary of the Society of Arts.

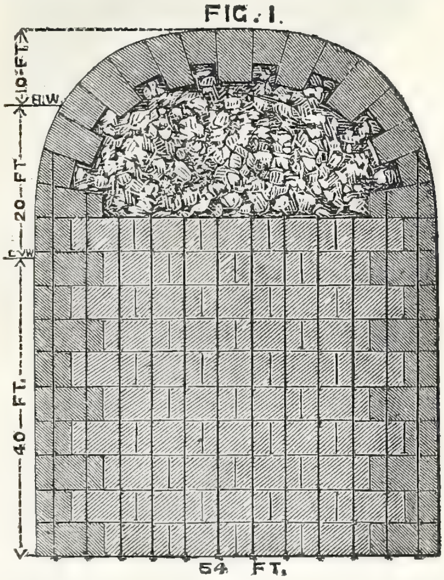
The Papers set at the Final Examinations held in May last are also published, and may be had of the Society's publishers, Messrs. Bell and Daldy, Fleet-street, price sixpence.

IMPROVEMENTS IN THE CONSTRUCTION OF HARBOURS, BREAKWATERS, PIERS, JETTIES, SEA AND RIVER WALLS, &c.

By Alexander Doull, C.E.

Fig. 1 is the section of a breakwater with vertical walls constructed in 10 fathoms water, 40ft. below low water, and 20ft. between high and low water, and 10ft. above high water, making 70ft. as the whole height of the structure.

FIG. 1.



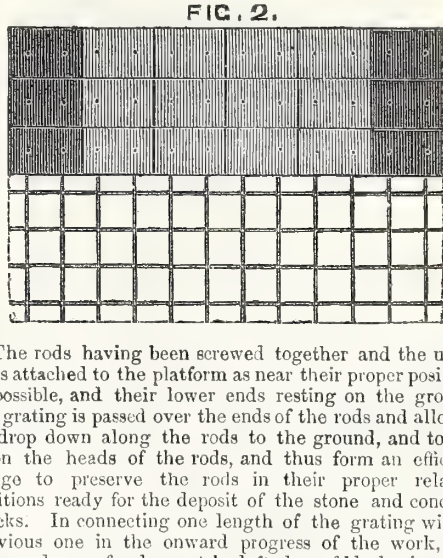
The section is 54ft. wide at the base, and is carried up perpendicularly to about 10ft. above low-water line, and is then finished by a flat curve. It is considered that the curved form given to the top of the work will secure the stones more firmly in their positions, and will allow the top of the wave to pass over the wall and fall into the harbour without propagating a wave, or causing an inconvenient disturbance of the water in the harbour, and also with the least possible injury to the wall. In this section the work is composed of stone blocks, averaging 9ft. long, 4½ft. broad, and 4½ft. thick, weighing about 11 tons each. These stone blocks are placed headers and stretchers in the outside of the work, the inside being filled up by concrete blocks of the same dimensions. The dimensions of the blocks, both of stone and concrete, would, however, be occasionally varied in length and thickness, in order the more effectually to break bond horizontally and vertically. The concrete blocks in the interior of the work would be continued up to low-water line, after which the centre of the work would be composed of concrete in mass, and the outside and top of stone blocks, which may be cramped together in any convenient manner.

The blocks of stone and concrete are placed in position up to the low-water line by guide rods of malleable iron, about 3in. diameter, two rods passing through each block. The holes in the blocks of stone would probably be more economically and accurately bored by machinery; the holes in the concrete blocks would be moulded in them at the time of their formation, and would consequently cause no additional expense.

During the process of construction, the rods would be carried up to the staging, and the upper ends of them secured in such a manner that any two of them could be disengaged and inserted into the hole of the block previously to its being lowered into its position from the staging.

In order to place the rods at the proper distance from each other, and to retain them in that position, agreeing accurately with the holes in the several blocks, the grating (fig. 2) is made use of. It is composed of flat bars of malleable iron, about 6in. broad, and half an inch thick, rivetted or welded together, and holes bored in the intersections of the bars accurately corresponding to the holes in the block. This grating would be formed in convenient lengths.

FIG. 2.



The rods having been screwed together and the upper ends attached to the platform as near their proper positions as possible, and their lower ends resting on the ground, the grating is passed over the ends of the rods and allowed to drop down along the rods to the ground, and to rest upon the heads of the rods, and thus form an efficient gauge to preserve the rods in their proper relative positions ready for the deposit of the stone and concrete blocks. In connecting one length of the grating with a previous one in the onward progress of the work, the advanced row of rods must be left clear of blocks, in order that the set of holes in the next portion of grating shall pass over the rods in the advanced holes of the previous grating. It will thus be observed that two sets of holes will pass over one set of rods at the junction of every successive portion of the grating.

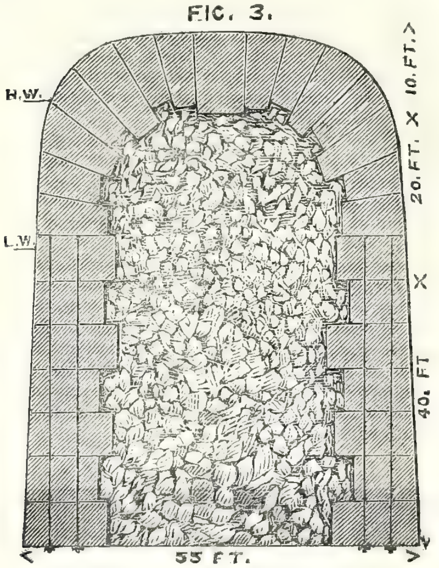
This mode of construction would be well suited for such works as those which are at present being carried on in connection with the proposed Harbour of Refuge at Dover, and which is said to cost about £1,100 or £1,200 per yard forward. The slow progress of the works, consequent upon diving-bell operations, is so great, and the expense of construction so excessive, that no reasonable hope can be entertained of ever obtaining a Harbour of Refuge at Dover by the means at present in operation.

The only alteration necessary to be made from the above in the construction of *circular pierheads*, would be to form the iron grating used for the proper adjustment of the guide rods in a circular or any other required form, and to prepare the holes in the stone or concrete blocks to

correspond to the position of the rods. This, it is presumed, would be an expeditious and cheap mode of constructing pier-heads in connection with breakwaters where the whole of the materials had been thrown into the sea from tramways, but where the pier-heads are, as at present, constructed by the aid of the diving-bell.

The following (fig. 3) is a still cheaper mode of

FIG. 3.



constructing a harbour of refuge than that already described:—

The outside courses are constructed of blocks of concrete, faced on the ends and sides which are exposed to the wash of the water, with hard blue bricks, manufactured expressly in such a manner as to unite more effectually with the concrete. These brick facings would be carefully built in cement in the end or side of the mould in which the concrete block is formed. The brickwork would be completed, and the concrete poured in afterwards, or the two materials could be applied simultaneously. Holes for the guide rods would be preserved in the blocks when they are being moulded.

Blocks of a large size may also be used, probably from 40 to 50 tons weight; and by substituting cast for malleable iron in guide rods, it being more durable than malleable iron in sea water, considerable stability would be derived from the guide rods, as they could be screwed into proper gauge by the grating already described.

The centre of a construction of this description may be composed of rubble stone, brought up in layers corresponding with the outside block courses. On the top of each layer of stone, liquid concrete would be put down in boxes or leather tubes, sufficient to fill up the interstices of the stone rubble.

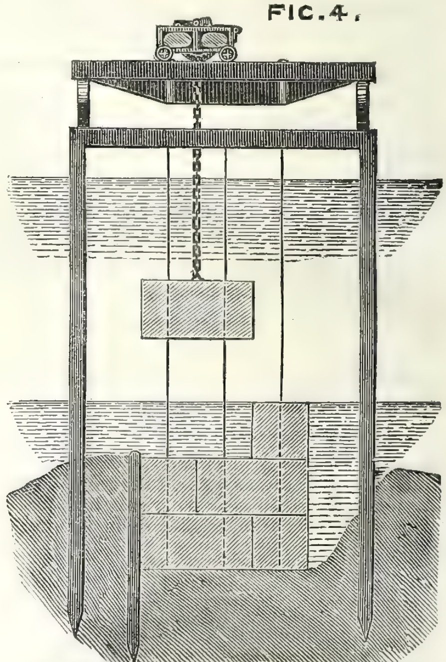
In some situations the chalk could be employed for the purpose of filling. The only essential condition in this case would be, that no water be allowed to pass in through the exterior block casing to wash away the chalk. The economy would also be very great where hard block chalk in abundance can be found upon the spot.

The expense of a structure of this description would probably be about £150 per yard forward, or about two miles of wall for little more than half a million of money.

In constructing a breakwater (such, for example, as in the bay of Wick), where the stone to be used is of the nature of slate, or large slabs comparatively thin: in this case it is essential that the stone should be placed vertically in the outside of the work; for, if large flat stones are thrown into the sea from a staging, they would spread out to a very inconvenient extent.

For the purpose of placing the stones composing the outsides of the work in a vertical position, or nearly so, a frame (somewhat similar to those used in hoisting materials to buildings) would be used, extending from the

FIG. 4.



staging to the bottom of the sea, and capable of being raised or lowered according to the irregularities of the bottom. To this frame a slide would be attached upon which the stone would be placed, and, when lowered into its position, the slide would be so arranged that a portion of it would be acted upon from the platform so as to cast the stone forward into its place. The weight of the stone about to be placed would press out the lower end of the vertical frame sufficiently far from the finished work to admit the deposit of stones successively sent down in the progress of the work. A diver could be occasionally sent down to examine the progress of the work.

Fig. 4 is a cross section of a river wall, about 12 ft. or 15 ft. below low water, and in about 10 ft. of excavated mud or gravel. Staging is erected over the length of the portion of wall in progress, and the excavation is effected to the necessary depth by a vertical dredger, attached to a traveller in such a manner as to be readily placed over every portion of space to be operated upon. The dredger or excavator would be lowered as the work progressed, and by this means the bottom of the excavated portion would be formed perfectly level, ready to receive the concrete blocks. The concrete blocks would be formed of any convenient size, and each block would have two holes in it, for the purpose of being placed in position, as above described with reference to breakwaters.

Cast-iron sheet piling would be driven on the river side to protect the concrete blocks from the action of the current, and also to guard against injury to the foundation by the scouring out of the bed of the river when its breadth had been contracted.

This sheet piling on the river side, and temporary sheet piling on the land side, would be necessary to preserve the proper form of the excavation until the concrete blocks have been deposited.

This mode of putting in the foundation of river walls, it is presumed, is peculiarly applicable to the embankment of the north and south sides of the Thames, about to be undertaken by the Board of Works—more efficient and more economical than by sinking cylinders by divers.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, NEWCASTLE-UPON-TYNE, 1863.

The following is a list of the Papers read in the various Sections:—

THURSDAY, AUGUST 27TH, 1863.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

Fleeming Jenkin.—Report of the Committee on Electrical Standards.

Rev. Dr. Robinson.—Report of the Committee on Fog Signals.

E. J. Stoney.—Interim Report on Molecular Physics.

Fleeming Jenkin.—Interim Report on Thermo-electrical Phenomena.

Abbé Moigno exhibited and explained on the part of MM. Eugène Bourdon and Salleron, an apparatus called an "Injector of Solids."

Prof. Phillips.—Researches on the Moon.

Balfour Stewart.—On Sun Spots and their connection with Planetary Configurations.

Prof. Coffin.—On the path of a Meteoric Fireball relatively to the Earth's centre.

Prof. C. P. Smyth.—On the changing colour of the Star 95 *Herculis.*

Hermann Schlagintweit.—On a new Revolving Scale for measuring curved lines, communicated by the Abbé Moigno.

A. Claudet.—On some Phenomena produced by the refractive power of the eye.

SECTION B.—CHEMICAL SCIENCE.

Address by the President.

I. Papers on Local Manufactures—

Glass and Earthenware.

Fire Clay Goods.—By Joseph Cowen, Blaydon Burn.

Glass.—By R. W. Swinburne, South Shields.

Earthenware.—By C. T. Maling, Newcastle.

II. On the Oxidation of β Hexylic Alcohol.—By Prof. Wanklyn, F.C.S.

III. Some results of experiments on Lucifer Matches and others ignited by Friction.—By F. A. Abel, F.R.S.

IV. On the presence of a Salt of Baryta in Colliery Water.—By T. Richardson, Ph. D.

V. On a New Gas Furnace for Scientific and Practical purposes.—By George Gore, Birmingham.

VI. On Disinfectants.—By H. B. Condy, F.C.S., Battersea.

SECTION C.—GEOLOGY.

The President.—Opening Address.

Nicholas Wood, John Taylor, John Marley, and J. W. Pease.—On Coal, Coke, and Coal Mining in Northumberland and Durham.

John Hogg, M.A., F.R.S.—On the Fossil Teeth of a Horse found in the Red Clay at Stockton.

J. P. Lesley.—On the Coal Measures of Sydney, Cape Breton.

G. B. Forster and John Daglish, F.G.S.—On the Magnesian Limestone of the County of Durham.

Professor Harkness, F.R.S.—Skiddaw Slate Fossils.

Professor Harkness, F.R.S. — On the Hornblendic Greenstones and their relations to the Metamorphic and Silurian Rocks of the County of Tyrone.

H. C. Sorby, F.R.S.—On Models illustrating the Contortions in Mica-Schist and Slate.

SECTION D.—ZOOLOGY AND BOTANY.

The President.—Introductory Remarks.

J. Gwyn Jeffreys, F.R.S.—Report of the Committee appointed for Exploring the Coast of Shetland by means of the Dredge.

George Hodge.—List of the British Pycnogonidæ, with descriptions of several New Species.

G. S. Brady.—On the Zoology of Hylton Dene, near Sunderland.

G. S. Brady.—On the Marine Cyclopoid Entomostraca (Calanidæ), with Notices of some Species New to Britain.

Dr. Davy.—On the Colour of the Salmon.

Joshua Alder.—Descriptions of New British Polyzoa, with remarks on some imperfectly known Species.

Clements R. Markham.—On the Cultivation of Cinchona in India.

The President.—On the Structure of the Fruit of Clerodendron Thomsonæ (Balf), from Old Calibar.

Rev. H. B. Tristram.—On some elucidations of the Geological History of North Africa, supplied by its lacustrine Fauna.

SUB-SECTION D.—PHYSIOLOGY.

The President's Address.

Dr. Embleton.—Notes on certain parts of the Anatomy of a young Chimpanzee.

Dr. Davy.—Observations on the Eggs of Birds.

Stewart Clark.—On the Ventilation of Barracks and other Public Buildings in India.

Dr. William Murray.—On the Investigation of Instinctive Actions.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

President's Address.

Captain Bedford Pim, R.N.—Proposed Inter-Oceanic and International Transit Route across Central America.

Captain George Fleming.—From Tientsin (North China) to the Capital of Mantchu Tartary.

John Crawfurd, F.R.S.—On the Commixture of the Races of Man as affecting the Progress of Civilisation in the New World.

Dr. James Hunt (Pres. Anthropological Soc.).—On Anthropological Classification.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

President's opening remarks.

Dr. Jas. Bird.—On the Vital and Sanitary Statistics of our European Army in India, compared with those of the French Army under like conditions of Climate and Locality.

C. H. Bracebridge.—Coventry Freehold Land Society.

Frederick Purdy.—On the decrease of the Agricultural Population of England, A.D. 1851-61.

Henry Fawcett.—On the effects of the recent Gold discoveries.

SECTION G.—MECHANICAL SCIENCE.

C. T. Porter.—Richard's Indicator for Steam Engines.

P. Westmacott and J. F. Spencer.—Engineering Manufactures of the Tyne and Neighbouring Districts.

J. Jamieson.—Air Engines.

Robert and William Hawthorn.—New Method of Working Railways by Stationary Engines.

R. A. Peacock.—New Plan for Hanging Dock Gates.

Geo. Fawcus.—A New Method of Constructing Boats, so that any number may be packed one inside the other.

D. Puseley.—On Thompson's Universal Stopper for Bottles, Casks, &c.

In the evening, at 8 o'clock, a conversazione took place at the Central Exchange News Room.

FRIDAY, AUGUST 28, 1863.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

B.S. Proctor.—On the Focal Adjustment of the Eye.

A. Claudet.—On the Star Chromatoscope.

Dr. Akin.—On the Transmutation of Spectral Rays.

Abbé Moigno exhibited and described M. Soleil's Tenebroscope for showing the Invisibility of Light.

Prof. C. P. Smyth.—On the Newcastle Time Gun.

Prof. D. E. Hughes.—On a Printing Telegraph.

W. Cook.—On Bonelli's Printing Telegraph.

W. Ladd exhibited a new form of Syren.

W. Ladd exhibited an Acoustic Telegraph.

W. Ladd exhibited an Electro-motive Engine.

R. S. Browne.—On the Distances of the Planets.

C. W. Siemens.—On the Electric Resistance and the Electrification of India-rubber under a pressure of 300 tons.

Section B.—Chemical Science.

Report of the Committee on Gun Cotton.

Papers on Local Manufactures.

J. C. Stevenson, R. C. Clapham, and T. Richardson.—Chemical Manufactures.

J. Pattinson.—On the various kinds of Pyrites used on the Tyne and Neighbourhood for the Manufacture of Sulphuric Acid.

Section C.—Geology.

Dr. Dawson.—On two new Coal Plants from Nova Scotia.

H. C. Sorby.—On Models illustrating the Contortions in Mica-schist and Slate.

Prof. Ansted.—On a Deposit of Sulphur in Corfu.

Prof. Ansted.—On the Metamorphic Origin of the Porphyritic Rocks of Charnwood Forest.

E. Holl.—On the Laurentian Rocks in the Malvern Hills.

Charles Moore.—On the Equivalents of the Cleveland-hill Ironstones in the West of England.

Charles Moore.—On the Organic Contents of the Lead Veins of Allenheads and of Yorkshire.

Section D.—Zoology and Botany.

Rev. A. Merle Norman, M.A.—Report of the Committee appointed to dredge the Shetland Seas. Part II.

George Hodge, G. S. Brady, and Joshua Alder.—Report of the Committee for dredging the Coast of Durham and Northumberland.

John Leckenby.—Reports of the Results of a three weeks' Dredging Cruise off Scarborough, in 1863. Commuicated by Captain Woodall.

Thomas Johnson.—An Account of the Attempts to transport Salmon to Australia.

J. Hogg.—On the Roman and Imperial Crested Eagles.

C. Spence Bate.—On a new species of Ione.

Dr. Maxwell T. Masters.—Note on certain influences regulating the forms of leaves, &c.

Sub Section D.—Physiology.

Dr. George D. Gibb.—Report on the Physiological effects of the Bromide of Ammonium.

Dr. B. W. Richardson.—On the Physiological properties of the Nitrite of Amyle.

Dr. Davy.—On the Blood in relation to the question: Is Ammonia one of its normal constituents?

Dr. Pavy.—On the reason why the Stomach is not digested by its own Secretion during life.

Section E.—Geography and Ethnology.

J. Crawfurd.—A few Notes on Sir Charles Lyell's "Antiquity of Man."

Robert Swinhoe, H.M. Consul at Taiwan.—Geographical Notes on the Island of Formosa.

J. A. Lapham.—Some facts respecting the Great Lakes of North America.

Dr. James Hunt.—On the Physical and Mental Characters of the Negro.

Section F.—Economic Science and Statistics.

Discussion on Mr. Fawcett's Paper, on the effects of the recent Gold discoveries.

James Heywood.—On the opening and extension of Durham University Academical Endowments.

Dr. Camps.—On the Sanitary condition of the Troops in India.

Section G.—Mechanical Science.

W. H. Richardson.—On the Paper Manufactures of Northumberland and Durham.

Discussion on Messrs. Hawthorn's Paper on a new method of working Railways by stationary Engines.

C. W. Siemens.—On regenerative Gas Furnaces as applied to Iron Works.

Messrs. E. Salmon and John Collinson.—Reports and Sections relating to Capt. Bedford Pim's projected Transit Route through Central America, shewing the *modus operandi* of surveying in the Forests of that Country.

D. D. Main.—Newcastle and Gateshead Water supply.

Admiral Sir E. Belcher.—Description of a Spirit Level Telescope for observing Altitudes and obtaining Latitudes independently of natural or artificial Horizons.

Abbé Moigno exhibited a Model and gave an explanation of Messrs. Bourdon and Salleron's Apparatus termed "Injecteur pour les corps solides."

C. B. King.—On extinguishing Fires.

In the evening Professor Williamson, F.R.S., delivered a discourse on the Chemistry of the Galvanic Battery, considered in relation to dynamics, illustrated by experiments.

SATURDAY, AUGUST 29th.

Section A.—Mathematical and Physical Science.

J. Glaisher.—Report on Luminous Meteors.

Professor Hennessy.—Interim Report on the Vertical Motion of Currents of Air.

Professor C. P. Smyth.—On a Proof of the Dioptric and Actinic quality of the Atmosphere at a high elevation.

Dr. Lee.—Description of a Solar Eye-piece, invented by Mr. Dawes, F.R.A.S.

Dr. Hincks.—On the Relationship between the variation of the Earth's Eccentricity and that of the Moon's Mean Motion in longitude.

Dr. Moffat.—On the Connection that exists between Admiral Fitzroy's "Caution Telegrams" and the Luminosity of Phosphorus.

Section B.—Chemical Science.

Did not Meet.

Section C.—Geology.

Report on the Distribution of the Organic Remains of the North Staffordshire Coal-field.

Wm. Pengelly.—On the chronological value of the Triassic Rocks of Devonshire.

J. Alexander Davies.—On the causes of Earthquakes and Volcanic Eruptions.

Rev. James Brodie.—On the Physical Condition of the Earth in the earlier epochs of its history.

Harry Seeley.—On a Help to the Identification of Fossil Bivalve Shells.

W. Bainbridge.—On the Penine Fault.

Matthias Dunn.—On Coal in the Red Measures.

T. A. Readwin.—On the recent Discovery of Gold near Bala Lake, Merionethshire.

Section D.—Zoology and Botany.

Did not Meet.

Sub-section D.—Physiology.

Albany Hancock.—On the Renal Organ—the so-called water system in the Nudibranchiate Molluscs.

Professor Rolleston.—On the Renal Organ of the Aplysia.
William Turner—On Cranial Deformities, more especially on the Scaphocephalic Skull.
James Samuelson—On Life in the Atmosphere.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

Professor Ansted, F.R.S.—On some Curiosities of Physical Geography in the Ionian Islands.
W. Wheelwright.—Central Argentine Railway from Rosario to Cordova and across the Cordillera of the Andes.
Osbert Salvin.—On the Physical Geography of Guatemala.
John Crawfurd.—On the so-called Celtic languages in reference to the question of Race.
R. S. Charnock.—On Celtic languages.
C. Carter Blake.—On some points in the Cranioscopy of the nations of South America.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

Discussion on Dr. Camps' Paper, on the Sanitary Condition of the Troops in India.
Col. Torrens.—On Transportation in connection with Colonization.
Frederick Purdy.—On Mortality in Lancashire.
James Heywoood.—Remarks on Native Colonial Schools and Hospitals, from the Sanitary Statistics of Miss Florence Nightingale.
The late T. C. Angus.—Statistics of the Tanning Trade of Newcastle-on-Tyne (communicated by James Potts).

SECTION G.—MECHANICAL SCIENCE.

Dr. White.—On the Prevention of Fouling of Ships' Bottoms.
Dr. Gladstone and J. Scott Russell.—Report of the Joint Committee on Austrian Gun Cotton.
John Sturgeon.—Self-acting Valve Motion for Steam Hammers.

MONDAY, AUGUST 31ST.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

Col. Sykes.—Report of Balloon Committee.
J. Glaisher.—Report on Balloon Ascent.
J. J. Murphy.—On the distribution of heat on the Sun's Surface, and the Currents of his Atmosphere.
E. J. Lowe.—On Ozone, more especially on Ozone tests.
B. Stewart.—Comparisons of curves afforded by Self-Recording Magnetographs at Kew and Lisbon.
W. R. Birt.—On the Selenographical relations between the chain of Lunar mountains "the Alps," with the "Mare Imbrium," and the "Mare Frigoris." Communicated by Dr. Lee.
Prof. Chevallier.—Description of an Instrument for ascertaining the Height of a Cloud.
G. J. Symons.—Description of the experimental series of Rain-Gauges erected at Calne.
Rev. J. Rankine.—Meteorological Observations.

SECTION B.—CHEMICAL SCIENCE.

Professor Wanklyn.—On Fractional Distillation.
Dr. Matthiessen, and G. C. Foster.—On the Constitution and Rational Formula of Narcotine.
I. L. Bell, T. Sopwith, Dr. Richardson, and T. Spencer.—Report on the Metallurgy of the District.
Dr. Riley.—On Titanium in Iron.
J. Pattinson.—On deposit in blast furnaces.
J. Pattinson.—On Zinc, Nickel, and Cobalt in Cleveland Ironstone.
I. L. Bell.—On Aluminium.
Dr. Matthiessen.—Report on the Chemical Nature of alloys.

SECTION C.—GEOLOGY.

Alexander Bryson.—On the Origin of Granite.
Professor Phillips.—On the Deposit of the Gravel, Sand, and Loam, with Flint Implements at St. Acheul.
Professor Phillips.—On the drift Beds at Mundesley, Norfolk.
R. A. Godwin-Austen.—On the Alluvial Accumulations in the Valleys of the Somme and Ouse.
J. B. Jukes.—On certain Markings on the Horns of Megaceros Hibernicus.
G. E. Roberts.—On the Discovery of Elephant and other Mammalian Remains in Oxfordshire.
Dr. Hulburt.—Some Facts relating to the Hydrography of the St. Lawrence and the Great Lakes.

SECTION D.—ZOOLOGY AND BOTANY.

Dr. Hulburt.—Notes on Canadian Forests.
C. Carter Blake.—On the Syndactylous Condition of the Hand in Man and the Anthropoid Apes.
H. B. Brady.—Notes on the occurrence of Foraminifera new to the British Seas.
Prof. T. Rupert Jones and W. K. Parker.—Notes on some recent Foraminifera, dredged at Jamaica by the late Lucas Barret, F.G.S.
C. Spence Bate.—Notes on the Homologies of the Trilobites.
A. R. Wallace.—On the Geographical distribution of Animal life.
Rev. H. B. Tristram.—A few facts on the Variation of Species pointing to Western Asia as the centre of the Palœarctic Area of Creation.

SUB-SECTION D.—PHYSIOLOGY.

Dr. White.—On the Means of passing unharmed through noxious Gases or Vapours.
Dr. G. Robinson.—On the Nature and Varieties of Organic Effluvia.
Dr. George D. Gibb.—Further observations on the normal position of the Epiglottis.
Dr. George D. Gibb.—On voluntary closure of the Glottis, independently of the act of breathing.
Dr. Cleland.—On the ligamentous action of the long muscles in Man and other animals.
Dr. Cleland.—Note on the change of Attitude which takes place in Infants beginning to walk.
R. Garner.—On the Reciprocal Action between plants and gases.
Dr. G. Robinson.—On the practicability of arresting the development of Epidemic Diseases by the internal use of anti-zymotic agents.
Dr. Donkin.—On the physiological action of the Uterus in Parturition.
Professor Rolleston.—On the Condition of the Uterus after delivery in certain of the Mammalia.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

Captain Grant.—On his Travels with Captain Speke from Zanzibar to the Sources of the Nile.
John Hogg.—A short Account of old Maps of Africa.
Signor Miani.—On his Travels towards the Sources of the Nile.
Baron von Heuglin.—On his exploration of certain Affluents of the Nile.
Mutu Coomara Swamy.—The Ethnology of Ceylon, referring especially to its Singhalese and Tamil Inhabitants.
George E. Roberts and Professor Busk.—Note upon the opening of a Cist of the Stone Age near the Coast of Moray Frith.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

Thomas Webster. — Report of the Committee on Technical and Scientific Evidence in Courts of Law.
William Henry Charlton.—A Statistical Account of the Parish of Bellingham.

Col. Sykes.—Military Budgets of English and French Armies, for 1863-4, statistically compared.

William Neilson Hancock, LL.D.—On the difference between Irish and English Poor-Law.

Section G.—Mechanical Science.

C. M. Palmer.—Iron Ship Building on the Tyne and neighbouring Districts.

Prof. Rankine.—On the Proportions of Ships of least Skin Resistance for a given Speed and Displacement.

Prof. Rankine.—An Investigation of Plane Water Lines for Ships.

Robert Taylorson.—The Diagonal Principle of Iron Ship-building.

Admiral Sir Edward Belcher.—A mode of rendering Timber-built Ships impregnable and unsinkable under moderate Crew Power, as in a leaky Vessel.

Admiral Sir E. Belcher.—On an improved Caisson Gate.

Abbé Moigno exhibited and gave Explanations of the "Ventilateur à Reaction" of Mons. Perigault de Rennes, and of the "Balance Aerostatique" of Mons. Seiler.

A *Soirée* took place at the Central Exchange News-room.

TUESDAY, SEPTEMBER 1st.

Section A.—Mathematical and Physical Science.

H. Swan.—On a new kind of Miniature, possessing apparent solidity by means of a combination of prisms.

Dr. Lee.—On the Lunar Mare Smithii, the Phillips' Walled Plain and the Percy Mountains.

Dr. Buys Ballot.—On the system of forecasting the weather pursued in Holland.

Dr. Akin.—Account of preliminary experiments on Chalkessence.

Professor Plücker.—On Spectral Analysis.

Dr. Gladstone and Mr. Dale.—On specific refractive energy.

Professor Sylvester.—On the quantity and centre of gravity of figures given in perspective, or homography.

S. Alexander.—On the augmentation of the apparent diameter of a body by atmospheric refraction.

J. J. Walker.—On the conditions of the Resolvability of Homogeneous, Algebraical Polynomials into factors.

T. Tate.—On the Elasticity of the Vapour of Sulphuric Acid.

Professor W. Thompson.—On the result of reductions of curves obtained from the self-recording Electrometer at Kew.

J. Swan.—On a Mercurial Air Pump.

W. Symons.—On a new Marine Barometer, and on a Maximum Thermometer with a new Scale.

Section B.—Chemical Science.

I. L. Bell, T. Sopwith, Dr. Richardson, and T. Spencer —Report on the Metallurgy of the District, continued.

Dr. Richardson.—On the separation of Lead and Antimony.

W. Baker.—On the impurities contained in lead and their influence on its technical uses.

W. Crookes.—On Thallium.

I. L. Bell.—On Thallium.

Dr. Stevenson Macadam.—On the Analysis of Chinese Iron.

Dr. Davey.—On the slaking of quick-lime.

Dr. Zenner.—On impurities in Lead.

L. Kessler.—Sur les procédés de gravure du verre à l'aide de l'acide fluor-hydrique par impression de la réserve.

L. Kessler.—Sur des appareils nouveaux evaporant à multiple effet et à air libre nommés *Evorateurs*.

L. Kessler.—Sur les avantages commerciaux d'un nouveau sel de soude cristallisé.

Duncan C. Dallas.—On Photelectric Engraving and observations upon sundry processes of Photographic Engraving.

H. Kilgour.—Abstract of Paper: Are Nitrogen and Carbonic Oxide the Oxide of Carbon in different Allotropic or Isomeric states?

R. C. Clapham and J. Daglish.—On the Minerals and Salts found in Coal Pits.

Dr. Richardson.—Researches on the Manufacture of Prussiate of Potash by the late John Lee and T. Richardson.

M. l'Abbé Moigno.—Short communications on Galvanic Copper, Photo-lithography, and Photo-microscopic specimens.

Section C.—Geology.

Report on the Chemical and the Mineralogical Composition of the Granite of Donegal.

Professor James Thomson.—On the Origin of the Jointed Prismatic Structure in Basalts and other Igneous Rocks.

Professor T. Rupert Jones and J. W. Kirby.—On a Synopsis of the Bivalved Entomastraca of the Carboniferous Strata of Great Britain and Ireland.

Professor T. Rupert Jones and W. K. Parker.—Notes on some Fossil and Recent Foraminifera, collected in Jamaica, by the late Lucas Barrett, F.G.S.

J. W. Kirkby.—On some Fossil Fishes from the Permian Limestone of Fulwell, near Sunderland.

J. Gwyn Jeffreys.—Report of the Shetland Dredging Committee, in its Geological bearings.

J. Gwyn Jeffreys.—A list of the Upper Tertiary Fossils of Uddewalla, in Sweden.

Dr. A. W. Malm.—On the Upper Tertiary Strata of the Bohuslän District.

Nicholas Wood and Edward F. Boyd.—On a Wash or Drift through the Coal-field of Durham.

Sir Roderick I. Murchison and Professor Harkness.—Observations on the Permians of the N.W. of England.

Dr. Geinitz.—On a Salamander in the Rothliegendes.

Professor Harkness.—On the Reptiliferous and Footprint Sandstones of the N.E. of Scotland.

Section D.—Zoology and Botany.

Thomas Bewley.—Description of a new Plant House. Communicated by N. B. Ward, F.R.S.

N. B. Ward.—A Brief Account of the Vegetation of the Cliffs of Mohir, Co. Clare.

Charles W. Peach.—On the Occurrence of the Sperm Whale (Physeter Macrocephalus) at Wick.

C. W. Rose.—Notice of a Monstrosity in a Whiting.

A. R. Wallace.—On the Physical Geography of the Malay Archipelago.

N. Newton.—On the Irruption of Syrrhaptes paradoxus.

H. T. Stainton.—On the Generic Characters furnished by the different Modes of mining Leaves adopted by the Larvæ of Micro-Lepidoptera.

Rev. A. Merle Norman.—On British Holothuriadæ with reference to new species.

Rev. A. Merle Norman.—On the Morphology of the Echinodermata of the Family Ophiuridæ.

Robert Swinhoe.—Report on the Natural History of the Island Formosa.

P. P. Carpenter.—Report on the Mollusca of California.

W. Harper Pease.—On the Great Division of the Pacific Ocean Fauna. Communicated by P. P. Carpenter.

John Hogg.—On the Proliferous Cones of the Common Larch.

John Hogg.—List of Rarer Phœnogamous Plants in the S.E. of Durham discovered since 1829.

Sub-section D.—Physiology.

Dr. Junod.—On the Physiological Effect produced by several Apparatuses contrived for the purpose of causing a Vacuum upon the entire Body, or a part thereof.

Dr. Edward Smith.—On the Dietary of the Lancashire Operatives.

Dr. Wilson.—On the Coal Miners of Durham and Northumberland, their Habits and Diseases.

Dr. Edward Smith.—On the Dietaries of the Labouring Classes.

Thomas Nunnelly.—On the Calabar Bean.

R. Garner.—On a Parasitical Acarus of the Anodon.

B. W. Richardson.—Miners' Safety Mask for supporting Life in Fire-damp and other Noxious Vapour.

Dr. Kidd.—How to restore Drowned Persons, Patients in Chloroform Accidents, &c.

Section E.—Geography and Ethnology.

Lord Lovaine.—On the Recent Discovery of Lacustrine Human Habitations in Wigtonshire.

The Hon. R. Marsham.—Two Ascents of the Volcano of Misti.

Rev. J. E. Wood.—On the Rivers of the Interior of Australia.

Alfred Wallace.—On the Varieties of Man in the Malay Archipelago.

Captain Fleming.—Ethnology of Eastern Mantchuria.

Henry Duckworth.—On the Human Cranium found at Amiens.

William Turner.—On the Anatomical Characters of the Human Cranium found at Amiens.

Section F.—Economic Science and Statistics.

The President.—The Statistics connected with the Architectural Improvements in the City of Paris.

Henry C. Allhusen.—The Volunteer Force; its comparative Cost, Development, present State, and Prospect.

W. Fallows.—On the Origin of the Stockton and Darlington Railway. Communicated by James Potts.

Thomas Robins.—Observations on Criminals.

John Lamb.—On the Reduction of the Death Rate in Gateshead by Sanitary Measures.

Section G.—Mechanical Science.

Professor Pole.—Description of the large Gyroscope used by Sir William Armstrong.

Professor Airy.—On Boiler Explosions.

J. F. Ure.—On the Improvements now being carried out in the River Tyne.

Captain Douglas Galton.—On Targets for Gunnery Experiments.

George Richards.—Rifled Ordnance.

Robert Davidson.—On the Decortication of Cereals.

Robert Davidson.—On Improvements in Machinery and Apparatus for Cleansing and Purifying Casks.

Samuel Firth.—The Application of Machinery to Coal Cutting.

Abbé Moigno.—Caselli's auto-telegraph from Paris to Marseilles.

Abbé Moigno.—Oudry's galvano-copper and galvano-copper paint applicable to buildings, armour plates for ships.

George Fawcus.—Improvements in Waggons and Gun Carriages.

Thomas Page.—On Bridge Foundations.

W. Smith.—Report of the Committee on Steam-ship performances.

W. Smith—Harding's Valve and Apparatus for Atmospheric Railway Propulsion.

W. Smith.—James Spence's method of covering Boilers, Pipes, and Cylinders of Steam Engines for preventing the Radiation of Heat.

W. Smith.—Gray's Portable machinery or apparatus for Riveting, Chipping, &c.

W. Smith.—Jackson and Watkins' arrangement of direct acting Steam Engines.

Benjamin Fothergill.—Bowns Tyre fastening.

George Redfern.—Corrugated iron armour plates.

Jos. Robinson.—Improved manufacture of biscuits.

Dr. White.—Plans for preserving wines without bottles.

On this evening Mr. Glaisher gave a lecture on his balloon ascents.

WEDNESDAY, SEPTEMBER 2nd.

Section A.—Mathematical and Physical Science.

Prof. Rankine.—On the Mathematical Theory of Plane Water Lines.

W. H. Russell.—On a certain Class of Mathematical Symbols.

L'Abbé Moigno exhibited and explained the following instruments:—

A Free Air Barometer by the Abbé Jeannon; a Metallic, or Holosteric, Barometer, by M. Naudet; a new Micrometer, by M. H. Soleil.

L'Abbé Moigno exhibited Specimens of Telegraphic Facsimiles, produced by Caselli's method.

L'Abbé Moigno communicated a Paper by M. Oudry, on Galvanic Copper and its applications.

Fleeming Jenkin exhibited and explained a New Electrometer, by Professor W. Thomson.

Section B.—Chemical Science.

Dr. Stevenson Macadam.—On the Analysis of Chinese Iron.

M. Geo. Ville.—Définer par la végétation, l'état moleculaire des corps. Analyser la force végétale par des essais raisonnés de culture.

Alphonse Gages.—Report on Synthetic Researches on the Formation of Minerals.

Dr. F. L. Phipson.—On a New Method of measuring the Chemical Action of the Sun's Rays.

Dr. F. L. Phipson.—On Musical Sounds produced by Carbon.

Dr. Murray Thompson.—On New Zealand Lignites.

Dr. Otto Richter.—On the Chemical and Physical Principles in connection with the Specific Gravity of Liquid and Solid Substances.

W. Symons exhibited a new form of Gas Battery.

Dr. T. Wood.—On Oxidation by Ozone.

Dr. S. Macadam.—On the Manufacture of Superphosphates and Dissolved Bones.

Dr. B. H. Paul.—Recent Applications of the Hydrocarbons derived from Artificial and Natural Sources.

Dr. Richardson and T. W. Bunning.—On the Uses of Fuel in Marine Boilers.

Section C.—Geology.

John Marley.—On the Occurrence of Rock Salt at Middlesbro'.

G. E. Roberts.—On some Remains of Bothriolepis from the Upper Old Red Sandstone of Elgin.

George Tate.—Description of a Sea Star (Cribellites Carbonarius), from the Mountain Limestone of Northumberland, with a Notice of its Association with Carboniferous Plants.

Charles Attwood—Some Facts observed in Weardale.

T. Sopwith.—On a Section of the Strata from Hownesgill to Cross Fell.

Prof. William King.—On the Neanderthal Skull, or Reasons for believing it to belong to the Clydian Period, and to be specifically distinct from Man.

Thomas Atthey and James W. Kirkby.—On some Fish Remains that have occurred in the Coal Measures of Durham and Northumberland.

Section E.—Geography and Ethnology.

Colonel Pelly.—On the Tribes, Trade, and Resources around the shore line of the Persian Gulf.

J. Crawfurd.—On the Commixture of the Races of Man as affecting the progress of civilization in Eastern Asia and the Polynesian Islands.

Mr. Craft (an African Gentleman).—On his Visit to Dahomey.

Rev. G. R. Hall.—On the Aboriginal Occupation of North Tynedale and Western Northumberland. An illustration of the social life of the Northumbrian Celts.

J. Crawfurd.—The Origin of Gypsies.

George Petrie.—Antiquities of the Orkneys.

Professor Daniel Wilson.—Notice of the discovery of three additional Runic inscriptions in St. Molio's Cave, Holy Island, Argyleshire.

Hermann de Schlagintweit.—On Ethnographical Casts.

Vice-Consul Swinhoe.—Ethnology of the Island of Formosa.

Richard Lee.—The Extinction of Races.

George E. Roberts and Professor Busk.—Note upon the Opening of a Cist of the Stone age near the Coast of the Moray Firth.

FLAX IN SOUTH AUSTRALIA.

The following report on this subject has been addressed by Mr. McCalman to the Commissioner of Public Works in South Australia:—

Robe, Guichen Bay, May 27, 1863.

Sir,—I have the honour to acknowledge the receipt of your letter of the 7th inst. In accordance with your request I send you a brief report, stating my opinion as to the capabilities of the land in this district for the cultivation of flax. Although it is many years ago since the flax plant was discovered in Australia, yet it is by no means generally understood that the plant is indigenous, and this fact, as I shall subsequently point out, is one great recommendation for its being cultivated. The growing of flax in Australia has been at different times spoken of as an article of commerce, but the matter was allowed to drop, or laid aside, as a thing if not impossible at least improbable, the soil being in the estimation of some unsuitable, as well as the scarcity and price of labour being such as would make it unwarrantable even to give it a trial. On the subject of flax, Dr. Lang, in his "Philipsland," says:—"I have seen the wild flax growing myself on my brother's property on the Hunter, in New South Wales. Had I not known it was an indigenous plant I could not have distinguished it from the European variety." Then, again, speaking of the soil and climate of Victoria as being admirably adapted for the cultivation of flax, he further says:—"I cannot help regarding the circumstance as exceedingly important in its probable bearings, not only on the future advancement of the settlement, but on the empire generally." This is no mean authority, and there is one great fact that ought to be universally known in the commercial world, and that is that there are in Australia hundreds of thousands of acres of wild flax growing along the banks of the rivers, on the immense alluvial flats and numerous swamps, in some places so thick that it would be difficult to determine which was the predominant crop—grass, rushes, or flax. Years have now passed on, and no trial has been given to cultivate that valuable plant, which the very soil itself declares in unmistakeable language its suitableness to grow; yes, an indigenous plant, growing on land the least remunerative now, but which could be made the most productive land in the whole colony. Where my time and circumstances permitted me, I have made as minute an examination as I could over some of the large swamps and flats around here, and have found flax growing through all, in some parts thicker than others; and from small experiments I have made I am satisfied that, by a proper cultivation, a finer article can be produced than any of the European flax, or at least equal to the finest flax produced in Belgium or France, from which could be manufactured the finest cambric. An article suggesting the culture of flax and hemp appeared in the Melbourne *Age* six years ago, noticing that a premium had been offered by a lady of £50 to a master of a school, denominational or national, who would give successful instruction in the growth of flax and hemp, and their manufacture into rope; and the article goes on to say—"This is a step in the right direction; but as we have been accustomed to regard every kind of production, beyond that of mere food, as all but impossible, from the scarcity and consequent dearth of labour, many arts and manufactures that might be successfully cultivated, and with profit too, have been completely neglected. The time, however, is fast approaching when necessity will suggest a greater variety of industrial pursuits than at present exist, and industry will have a wider field and freer scope in a country possessing so many valuable natural endowments both as regards soil and climate." Now, at the present time, viewing the agricultural interest in its deeply depressed state, any new article of production ought to be of the greatest importance. What then could be ultimately of more advantage to the colony and to the agricultural interest than the successful cultivation of so valuable an article as flax? On examining the land where the flax is growing, I find that the best flax grows on the parts from which the water recedes quickest, the average length of the stalks being nearly three feet, and gradually diminishing in length and strength down to where the water lies for at least five months in the year; there it is found growing equally thick, but not longer than from five to seven inches. This fact at once suggests the necessity of draining; and if these swamps or marshes could be brought down and kept at their summer level, the object will be so far gained by the ground being made ready for cultivation; thus would thousands of acres be made available for growing one of the most profitable and valuable articles the soil could produce. The seeds of the flax yield a most valuable oil, and the oil-cake formed in the manufacture of this oil is most nutritious feeding for cattle. Here then we have—First, the finest fibre; secondly, the seed for oil; thirdly, the cake; and fourthly, the refuse of the flax dressing forms a valuable addition to the manure heap, especially in absorbing the liquid. The variety of industrial pursuits has made the home country flourish, and no doubt in time it will be the same here. I believe the process of steeping the flax is now superseded in England by a chemical process; with this process I am not acquainted, but one thing is certain, it will do much in the saving of labour. Alluding again to the article in the *Age* it further says:—"With all the advantages of machinery and chemical science, it is not too much to hope that a portion of the soil and industry of Australia may be devoted to such a useful purpose as the culture of the flax plant, and that valuable article added to our other productions." More than one hundred thousand tons of flax are annually imported into Great Britain, independent of what is grown in the United Kingdom, and the large quantity grown in Ireland. The *Age* concludes its article by saying:—"Means of employment for all must be gradually developed, and our country, if ever it would become great, must adopt every resource for rendering the soil the great supporter of its population." In reply to your other queries, I would respectfully suggest that a trial might be made on a small scale this year with imported seed, as it is now too late to obtain any quantity of the native seed; that an acre or more land may be secured for the purpose, which has been already broken up, and partially drained. I think that could be secured here. A flax company would succeed better in extending the cultivation of flax than individual enterprise, unless government were to take the initiative, and give it a fair trial, and, if successful, the example would then be followed up very likely by both companies and individuals. There is another way in which I would respectfully suggest that the government might come forward, *i.e.*, by holding out inducements in the way of premiums: something in this way:—To the grower of the largest number of statute acres, £—; ditto second ditto, £—; ditto for the best and cleanest—bushels of seed, £—; ditto for the second ditto, £—. For the best sample of prepared flax not less than — hundred weight, £—; ditto second ditto, £—; ditto third ditto, £—; ditto fourth ditto, £—. And the better to insure the proper cultiva-

tion and cleaning of the ground, it should be made known that the judges in inspecting the crops for the first two premiums will, in giving their decision, pay particular attention to the cleanliness of the land and the general cultivation. I may mention that at home a flax mill of sufficient size for the districts where that article is most cultivated, and which would dry, break, and scutch flax ready for the hickle, would cost from five to eight hundred pounds, according as it was water or steam power; and with warehouse attached from ten to twelve hundred pounds. Here, of course, the cost would be greater; but then, again, if a mill were put up here suitable for a large or small district, it might, for a little extra expense, be made available for other purposes as well, viz., the grinding of corn, the sawing of timber, the pumping of water, or the irrigation of the land with liquid manure, or water from the flax pit (if the steeping process was adhered to). By a successful trial on a small scale opinion then could be easily formed of all the requisites needed. Now, again, as to which would be the best seed to sow, long experience in growing crops and seed and rearing cattle has shown me that what is grown and reared on the place thrives best on the place, and I have found that this is the case as a rule. Where it is not it is the exception, which it may be in the case of the flax seed coming from a cold climate to a milder. What I have said in the first instance as to the flax growing best in land from which the water went off quickest, on examination of various places I found the same rule apply to all. I have made up a parcel of flax to go by the steamer on Saturday first, addressed to you. It contains three parcels of flax, two of green flax as pulled, the largest of which is from the flats here, and in which you will find a few stalks of four feet long or so, pulled from a fence of a field under cultivation and drained. That is an additional proof of what draining will do. The other green parcel is from the small gullies between the sand hillocks at Lowrie's-hill, where we are at present working. I am sorry I cannot send you a cleaner sample of prepared flax; in the one sent the straw is little more than broken from it; but three things were unfavourable—viz., some of the stalks were last year's, some not nearly ripe, and the water in which it was steeped was hard and brackish, and therefore unfit to make a fine sample, even if the whole sample had been nothing more than ripe. However, I look upon it as something interesting; and an eye at all acquainted with flax in examining it can discern in it fibres of the finest description. One great advantage more the lands will derive if the flats and swamps can be drained to their summer level: new grasses will spring up of a more nutritious description, and thereby will be able to carry (or graze) more cattle, as well as improve their condition. I enclose you the remainder of the seed. I have not sent flax or seed anywhere else, except a very small sample Mr. Coulthard got; and I have the honour to be,—Yours, &c.,

H. MURRAY McCALMAN.

The Hon. William Milne, Adelaide.

EXAMINATION PAPERS, 1863.

(Continued from page 672.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May:—

LOGIC AND MENTAL SCIENCE.

THREE HOURS ALLOWED.

All candidates should attempt six Logic questions, answering a part at least of question No. 13, and three questions in each of the other books which they have studied. They may, however, answer as many questions as they can.

1. Logic is concerned about the laws of thought, and not about the truth of things. Explain shortly that statement.
2. How are concepts or general notions formed?
3. What is meant by the extension and what by the comprehension of a concept? Give a few examples. State the law which regulates the mutual relations of extension and comprehension.
4. Give its logical name to each of the parts of this proposition: "To rise early is beneficial."
5. Express the following propositions, using the logical copula: "Man wants but little here below." "Poor people have few friends."
6. What is meant by the quantity and the quality of a proposition? And what are the signs of quantity and quality?
7. What is the rule of distribution in the case of universal affirmatives? Give an example, and also an instance in which the rule is violated.
8. Of what predicables is the species composed? What is Thomson's opinion in regard to the composition of the species?
9. Define Astronomy—a University—a School, naming the two parts of the definition.
10. What is the distinction between immediate and mediate inference?
11. State and illustrate the opposition between A and O.
12. Give a table of the syllogistic figures, taking M for the middle term, S for the minor term, and P for the major term.
13. State the mood and figure, and pronounce on the validity of each of the following syllogisms, pointing out the kind of fallacy which any of them may involve.

(*a*) All wise men speak little.
I am a wise man,
Therefore I speak little.

(*b*) All wise men speak little.
I speak little,
Therefore I am a wise man.

(*c*) The good are loved.
Aspasia was loved,
Therefore Aspasia was good.

(*d*) All vices excite indignation.
Emulation does not excite indignation,
Therefore emulation is not a vice.

(*e*) All humane men are lovers of liberty.
No slave-dealers are humane men,
Therefore, no slave-dealers are lovers of liberty.

14. Construct a syllogism in A A A in the second figure, and show what fallacy it involves.
15. Reduce to the first figure the following syllogism:—

The passions are common to brutes.
The virtues are not common to brutes.
Therefore, the virtues are not passions.

Or construct a syllogism of your own in the third figure, and reduce it to the first.

PALEY'S MORAL PHILOSOPHY.

1. State shortly Paley's arguments in disproof of a moral sense.
2. What, according to Paley, are the constituents of happiness?
3. What is Paley's definition of virtue?
4. Why, according to Paley, am I obliged to keep my word; and what is the difference between an act of prudence and an act of duty? Criticise his doctrine.
5. What is meant by the general, as distinguished from the particular, consequences of an action?
6. Give two or three instances showing that the general consequences of an action may be ruinous to society, while its particular consequences are insignificant.
7. As an objection to the doctrine of utility, it is said that before acting we must calculate the consequences of our actions, but that it is generally impossible to do this. Show how this objection is obviated by means of "general rules."
8. Give a short account of Paley's chapter "On wills."

Bishop Butler's Sermons.

1. Against whose doctrines in particular was the moral system of Butler directed?

2. What is Butler's general division of the principles of human nature?

3. What does he mean by "our nature" when he says that virtue consists in following our nature?

4. How does he establish the supremacy of conscience?

5. Explain Butler's doctrine of our appetites and desires, and contrast it with the doctrine which it was designed to refute?

6. How does self-love defeat its own end when it becomes a contracted affection? And how is self-love shown by Butler to be quite consistent with our love of our neighbour? In which sermon are these questions treated of?

7. Give a very short and general outline of his moral system.

Stewart's Philosophy of the Human Mind.

1. What is Stewart's doctrine of the will "in the case of operations which are become habitual in consequence of long practice?"

2. Distinguish between memory and conception.

3. In what respect do Reid and Stewart differ in their doctrines regarding the imagination.

4. Illustrate "casual associations" as a source of popular superstitions and prejudices. How are such prejudices best cured?

5. Into what principles does Stewart analyse the imagination.

6. Show how sensibility depends on the power of imagination.

7. "Experience diminishes the influence of passive impressions on the mind, but strengthens our active principles." Explain and illustrate this statement.

Bacon's Novum Organon.

1. Describe the different idols which beset the human mind.

2. Can you state when and where any of the Greek philosophers mentioned by Bacon lived?

3. What does Bacon mean by "Induction by simple enumeration," and what is his opinion of it?

4. How, according to Bacon, have men usually gone to work "in the investigation and discovery of any matter?"

5. How are the empiric, the dogmatist, and the true scientific labourer charcterised by Bacon?

6. How was natural philosophy corrupted by Aristotle, by Plato, and by the new Platonists?

7. What is "the real and legitimate goal of the sciences," and how has it been missed?

LATIN AND ROMAN HISTORY.

THREE HOURS ALLOWED.

Section I.

Translate—

Magnanime Aenea, non, si mihi Jupiter auctor
Spondeat, hoc sperem Italiam contingere cœlo.
Mutati transversa fremunt et vespere ab atro
Consurgunt venti, atque in nubem cogitur aër;
Nec nos obniti contra nec tendere tantum
Sufficimus. Superat quoniam Fortuna, sequamur,
Quoque vocat, vertamus iter. Nec litora longe
Fida reor fraterna Erycis portusque Sicanos,
Si modo rite memor servata remetior astra.
Tum pius Aeneas; Equidem sic poscere ventos
Jamdudum et frustra cerno te tendere contra.

1. Parse fully the words, *spondeat, cœlo, transversa, cogitur, sequamur, litora, servata, cerno.*

2. What is the general rule for the construction of *si?* Distinguish between *si dat, si dedit, si det, si daret, si dederit, si dedisset.*

3. Give the perfect tenses indicative of the verbs *contingere, fremunt, consurgunt, obniti, sufficimus, remetior, poscere.*

Section II.

Translate—

Excipiunt plausu pavidos, gaudentque tuentes
Dardanidæ, veterumque agnoscunt ora parentum.
Postquam omnem laeti consessum oculosque suorum
Lustravere in equis; signum clamore paratis
Epytides longe dedit, insonuitque flagello.
Olli discurrere pares atque agmina terni
Deductis solvere choris, rursusque vocati
Convertere vias infestaque tela tulere.
Inde alios ineunt cursus aliosque recursus
Adversis spatiis, alternosque orbibus orbes
Impediunt, pugnaeque cient simulacra sub armis;
Et nunc terga fuga nudant, nunc spicula vertunt
Infensi, facta pariter nunc pace feruntur.

1. Parse fully the words, *clamore, paratis, discurrere, ineunt, orbibus, fugâ, pace, feruntur.*

2. Give the perfect tenses indicative and the supines of the verbs *impediunt, cient, diductis, vertunt, factâ.*

3. What moods and tenses may be put after *post quam,* and with what meaning in each case?

Section III.

Translate—

Cum ipsa per sese res anceps esset, prout cujusque ingenium erat atrocius mitiusve suadentibus, tum incertiora omnia unus ex Privernatibus legatis fecit, magis condicionis, in qua natus esset, quam praesentis necessitatis memor, qui interrogatus a quodam tristioris sententiae auctore, quam poenam meritos Privernates censeret, "eam" inquit "quam merentur qui se libertate dignos censent;" cujus cum feroci responso infestiores factos videret consul eos, qui ante Privernatium causam impugnabant, ut ipse benigna interrogatione mitius responsum eliceret "quid, si poenam" inquit, "remittimus vobis, qualem nos pacem vobiscum habituros speremus?" "si bonam dederitis," inquit "et fidam et perpetuam: si malam haud diuturnam."—*Livy.* viii. 21.

1. Parse fully the words, *suadentibus, conditionis, interrogatus, censeret, libertate, responso, diceret, habituros.*

2. Give the perfect tenses indicative of the words, *merentur, censent, viderat, remittimus, dederitis.*

3. What is meant by *oratio obliqua?* Why is *censeret* in the subjunctive mood? Put the last answer of the *Privernat* in the above passage into the oblique form.

Section IV.

Translate—

Legati circumstantes sellam orabant, ut rem in posterum diem differret, et irae suae spatium et consilio tempus daret. Satis castigatam adolescentiam Fabii esse, satis deformatam victoriam: ne ad extremum finem supplicii tenderet, neu unico juveni, neu patri ejus clarissimo viro, neu Fabiae genti eam injungeret ignominiam. cum parum precibus, parum causa proficerent, intueri sævientem contionem jubebant. ita irritatis militum animis subdere ignem ac materiam seditioni non esse aetatis non prudentiae ejus. neminem id Q. Fabio poenam deprecanti suam vitio versurum, sed dictatori, si occaecatus ira infestam multitudinem in se pravo certamine movisset. postremo ne id se gratiae dare Q. Fabii crederet, se jus jurandum dare paratos esse non videri e re publica in Q. Fabium eo tempore animadverti.—*Livy.* viii. 32.

1. Parse fully the words, *circumstantes, diem, iræ, injungeret, animis, ætatis, vitio, dictatori.*

2. Give the perfect tenses indicative and the supines of the verbs, *differret, tenderet, proficerent, subdere, deprecanti, versurum, movisset, crederet.*

3. Put the words, "Postremo ne id se gratiæ dare Q. Fabii crederet, se jus jurandum dare paratos esse non videri e re publica in Q. Fabium eo tempore animadverti," into the direct form.

SECTION V.

1. Give an account of the Licinian Rogations.

2. What were the original powers of the Tribunate? Were any modifications made in the office as time went on?

3. In what relation did Latium stand to Rome just after the Gauls had quitted Rome, during the second Punic War, and in the days of the Gracchi?

4. What successive changes were made in the Roman law concerning debt?

5. What were the powers of a Dictator? What were the most important occasions of the appointment of such an officer?

6. Give an account of the first Samnite war.

SECTION VI.

1. Give an account of the Catilinarian conspiracy. What disputed point of Roman law was the Senate called upon to decide in dealing with the captured conspirators?

2. Sketch the life of Pompey.

3. Give an account of the successive Agrarian laws, which were either passed or proposed.

4. Distinguish between the Comitia Curiata, Comitia Centuriata, and Comitia Tributa.

5. By what steps did the Romans become a maritime power?

6. Give an account of the Roman Colonies, and define the rights which the colonists had.

(*To be continued*).

Home Correspondence.

UTILISATION OF SEWAGE.

SIR,—I see that in your impression of August 21st you give Baron Liebig's recent letter on the agricultural value of town sewage, and also a shorter one, introducing it, by Mr. Mechi, in which he says, "It settles definitively the question, hitherto much disputed, of the value of a ton of town sewage, taken at its outlet." And, further on, Mr. Mechi assumes that Baron Liebig's estimate establishes the value of 4d. per ton.

Is it really the case that in Baron Liebig's letter there is to be found a definitive settlement of the important question of the value of the manurial constituents in a ton of average metropolitan sewage? Nothing of the kind. The substance of what Baron Liebig really does say may be stated in a very few words. He says that if the average sewage have a certain assumed composition; and if to every 100 tons of sewage of such composition rather more than 1 cwt. of superphosphate of lime be added, it will then (after deducting the cost of the superphosphate) be worth about fourpence per ton, reckoned according to the constituents it contains; but that, if the superphosphate of lime be not added, it will only be worth 1⅓d. per ton.

But does Baron Liebig himself claim that his estimate is founded upon sufficiently established information as to the average composition of the metropolitan sewage? Quite the contrary. We have his own opinion upon this point very clearly stated. In reference to the analysis of sewage upon which he founds his calculations, he says, "Lacking more certain data, I take Professor Way's analysis of the sewer water, which this most reliable chemist made at the request of the General Board of Health." Again, "Regarding the component parts of the best sorts of guano, we have certain and reliable data—those relating to sewer water are less so; but we might long ago have been fully informed of its average contents if, last year, at the mouth of each sewer in London, five gallons of water had been collected morning and evening every day during the week, and at the end of the seventh day one gallon of the collected seventy gallons subjected to chemical analysis." And again, "In the calculation of the value of sewer water, there is one factor doubtful, viz., the absolute amount of phosphoric acid, ammonia, and potash, which a ton of the said water contains." What, then, I would ask, does Mr. Mechi mean by telling the public that Baron Liebig's letter "settles definitively the question, hitherto much disputed, of the value of a ton of sewage taken at its outlet?"

But is it even probable, judging from the evidence we have at command, that the average metropolitan sewage is anything like so strong as that upon the analysis of which Baron Liebig bases his estimates? Certainly not. I quite agree with Baron Liebig, that, however much individual samples of sewage may differ from one another, the relation of the ammonia to the other valuable constituents may, upon the average, be considered as pretty definite; and since the ammonia is reckoned to give three-fourths (more or less) of the money value, we may take the relative amounts of ammonia in sewage as indicating approximately the relative values of different samples. Now, Baron Liebig adopts, as the basis of his estimates, the analysis of Professor Way, of a sample of sewage from the Dorset-square sewer, which gave 17·96 grains of ammonia per gallon. In reference to that sample I have this morning received a letter from Professor Way, in which he says that I have his full authority for stating that it was "much above the average," and, he adds, "I should say fully twice the average strength." Again, Messrs. Hofmann and Witt give as the average of their analyses of the undiluted sewage, that is, the sewage without rainfall, 8·2 grains of ammonia per gallon. And again, taking into calculation the rate of flow, &c., Dr. Letheby's analyses, which constitute the most extensive series relating to the Metropolitan sewage, give a lower average still. Lastly, from entirely independent data, I think there is very little doubt that the real average metropolitan sewage would show less amounts of ammonia, and the associated valuable matters, than even the average of Dr. Letheby's samples. In fact, I believe there is no doubt that 10,000 tons of average metropolitan sewage, calculated by Baron Liebig's scale and method, but on the basis of its real composition, would show a value of less than one-fourth of £166 13s. 4d. so triumphantly assumed by Mr. Mechi on the basis of 4d. per ton.

I fully agree with Mr. Mechi, however, that the area over which town sewage can be profitably utilised must very much depend on the cost of application to the land. Indeed, at a recent meeting of the Committee of Sanitary Science at the Society of Arts, I suggested that the Society should take some steps to get reliable engineering information on this point. But what Mr. Mechi can mean by referring to the Croydon meadows, as if the experience there could be any guide as to the cost of raising sewage to given elevations, or were at all in favour of applying small quantities per acre, I cannot understand. It happens that I visited the Croydon meadows only last week. I was informed that the sewage of 18 to 20,000 people, was confined to something under 250 acres, and to succulent crops exclusively. Now, if we say 250 acres and 20,000 people, we have, besides other matters, the excretal matters of about 80 people to each acre; which, at Mr. Mechi's estimate of 16s. per head, would give £64, and at 6s. 8d. per head, the estimate of Mr. Lawes and myself, £26 13s. 4d. for the value of the manurial constituents per acre. But what was the complaint at Croydon? Why, that (notwithstanding, as Mr. Fenton told us in his evidence last year, the dry weather sewage amounts to 800,000 gallons per day, which is equal to 40 gallons per head per day, or 65 tons per head per annum, without rainfall) they had been suffering during this dry season for want of a sufficient bulk of sewage for the area of land under irrigation, and that the crops of meadow and Italian rye-grass had in consequence not answered expectations. The system at Croydon, too, is to let the sewage flow over a given area of land for several days and nights together.

I quite agree with Baron Liebig, also, that "there is one factor doubtful" in the calculation of the value of sewer water, viz., its average composition. I would suggest that a mixed commission of engineers and chemists, in whom all might have confidence, be appointed to superintend the gauging, sampling, analysis, and calculation, in such manner as really to settle definitively the approximate average composition of the metropolitan sewage, as it will have do be dealt with in any plan of utilisation. From my own experience of such matters, however, I do not think it would be sufficient to take samples night and morning only, as proposed by Baron Liebig.

But besides the engineering, chemical, and agricultural factors, there is a moral factor still wanting, without which a satisfactory solution of the sewage question bids fair to be long postponed. This moral factor is courage on the part of all really anxious for the profitable utilisation of town sewage to deal candidly with the public in regard to it, and not to misrepresent the facts of the case. This leads me to say a few words, in conclusion, on Baron Liebig's most unworthy allegation—not only unfounded, but directly contrary to the facts—that the manufacturers of artificial manures are "inimical to the utilisation of sewage, and, in the battle which is being fought, they constitute the inimical army, whose forces should be by no means underrated." Such an accusation may, perhaps, be naturally enough conceived and propagated by those who are directly interested in keeping the public ignorant on this question; but that it should be echoed by Baron Liebig, when himself putting forth estimates and calculations which, if based upon well-established facts, would most strikingly confirm the estimates and views of those he seeks to calumniate, is highly discreditable; though it will be well understood by all acquainted with recent agricultural discussions having no reference to the sewage question. It is, however, doubly discreditable to his prompters here, who, better still knowing the facts, have sought to get the weight of Baron Liebig's authority in condemnation of those whose statements they cannot refute. They seem to forget that, as the public become better informed on the subject, they will be apt to conclude that the allegation of improper motive and bias is perhaps less appropriate against those who fearlessly put the facts before them, in spite of obloquy, than against those who are constantly reiterating erroneous statements.

I am, &c., J. H. GILBERT.

Harpenden, St. Alban's, August 25th, 1863.

Proceedings of Institutions.

Banbridge Young Men's Mutual Improvement Society.—The eighth annual report congratulates the members and friends on the prosperous condition of this Institution, and on the satisfactory progress it has made. Since the last annual meeting it has been able to rent a house in which the members at all times, during each day, have a respectable place of resort. The number of active and honorary members in immediate connexion with the Society now number 113, which is an increase of upwards of forty during the past year. The reading-room is supplied with newspapers of daily and weekly issue, and the leading periodicals, magazines, &c., of the day. At the last meeting the library was very small; but through the liberality of the Marquis of Downshire (patron of the Society), who presented the Society with 145 volumes of books by the best authors, a good and useful library is being formed. It is hoped that other gentlemen will lend their assistance. The number of essays, discussions, and literary conversations brought before the Society by the active members, since the last anniversary, was, in all, 19; and their literary merit has been in no case under the average standard, while a high tone of thought pervaded many of them. Every paper has been followed by animated discussions; the various topics have been freely criticised, with a desire to arrive at truth; and thus by interchange of ideas respecting their contents, to mutually strengthen and enlighten the minds of the members; and the committee believe that they have been the means of a steady literary advancement on the part of the members. Eleven public lectures have been delivered in the Town Hall, of a valuable character. The following is the list of them:—Rev. J. Coutt's five lectures, viz.:—"John Bunyan and the Pilgrim's Progress." "The Overland Route to India." The Wonders of Nature." "The Frozen Regions, and the Fate of Sir John Franklin, Captain Crozier, and their brave companions." "Switzerland and its Scenery." Denis Leonard, Esq., a reading from Dickens' "Cricket on the Hearth;" Thomas Ringland, Esq., Belfast, on "Money;" The Rev. D. Gordon, on "Our Poets and Poetry;" D. J. Macgowan, Esq., M.D. (late of China and Japan), two lectures on "China and Japan;" John De Fraine, Esq., on "Funny Folks; or, Sketches of the Grumbler, the Gossip, Foppish Young Men, and Affected Young Ladies." The lectures by Mr. Leonard, Mr. Ringland, and the Rev. David Gordon were delivered free of charge to the Society. During the session, there were five classes for the study of music, elocution, history, English composition, and drawing. The four first mentioned classes were presided over by a few of the active members themselves, who, of course, gave their services gratuitously; the members of the drawing class paid their own teacher. The committee have engaged an able teacher, who, at moderate remuneration, will instruct those members who may avail themselves of his services in the French and German languages. Other classes will also be conducted by a few of the active members as formerly. The committee take the opportunity of reminding every friend of this Institution, that so long as it is without a building or hall which it can call its own, its labours cannot be so efficient as they otherwise would be to the rising generation of this locality. The committee also, for some time past, have been desirous to form a small museum, for the instruction of the members, but as yet they have not been able to make much progress. The treasurer's account shows that the receipts have been £93 0s. 2d., and that there is a small balance in hand. In the month of May last a *soirée* was held in the town-hall, under the auspices of the Society.

Association of Lancashire and Cheshire Institutions.—A Conference of the officers and friends of this association was held at the Mechanics' Institution, Manchester, on Saturday, 1st of August, "to receive and discuss information and suggestions calculated to promote and develop the educational interests and agencies of Lancashire and Cheshire. Sir J. P. Kay-Shuttleworth, Bart., occupied the chair; and there were present, Messrs. J. Hole and Barnett Blake, representing the Yorkshire Union of Mechanics' Institutes; G. Holcroft, Milnes, R. Rumney, J. H. Traice, J. A. Gibb, S. L. Chadwick, J. Greenhalgh, E. Wilde, James Blackburn, Edwin Simpson, Dr. J. Watts, Rev. Dr. Herbert, Dr. Martin; and Dr. Pankhurst, and David Morris, hon. secs. Mr. Hole said that the means of the Yorkshire Union were limited, in a pecuniary point of view, to about £200 or £300 a year; they had never had more than that sum at their disposal. When the Union was established, in 1827, its main object was to secure a system of lecturing, so that gentlemen going from one Institution to another might have their expenses economised. Owing to the great disinclination of institutions to take paid lecturers, mainly arising from their poverty, the plan was set aside, and manuscript lectures were adopted. This arrangement was found to lose its interest, and it also might be looked upon as a failure. They then adopted a system of gratuitous lectures, which was still in force. The next great step, and one of the most successful that the Union had ever adopted, was the appointment of an agent and lecturer. Had it not been for the exertions of its agent, the Yorkshire Union would probably have sunk down to one-half its present level. In addition to the two principal features he had

named—an agent and gratuitous lecturers—the Union possessed a village library, which was useful in starting little institutions. For instance, if the people of a small town desired to start a library, and had not at that moment the necessary funds, the Union would, at a small charge, lend them 100 or 200 volumes to form the nucleus of their library. Another object that they were accomplishing was the conducting of examinations in connection with the Society of Arts. This was left to Mr. Blake, their agent and lecturer. The Union believed that in the last-named department they were doing more good in improving the institutes than in any way yet attempted, especially by means of the preliminary examinations which had been established by the Society of Arts. That class of examination was best fitted to the status of pupils in mechanics' institutions. Mr. Blake said that he also attended as a deputation from the Yorkshire Union, and he should be very glad to offer any advice to the Lancashire and Cheshire Association that his experience dictated. He would first of all suggest that they should publish an annual report. That report would make known to the institutions composing the association what was the constitution of the association, what was done by the agent, and how an institution could secure gratuitous and manuscript lectures. A report would also give advice to those who required it. He found, on examining into many local institutions, that there was a great want of regularity in an important element of success —namely, lecturing. Otley was not a large place, yet it had a most successful institution, and he attributed this state of things to the fact that the institution was continually before the public by its regular weekly lectures. The same might be said of Scarborough. Another element of machinery to which Mr. Hole had briefly alluded was the examinations. By passing the Elementary Examination, any candidate of sufficient age might qualify himself for the Society of Arts. And if young men could be stimulated to undergo these preliminary or elementary examinations, they would be tempted to undergo some of the more trying examinations. As to an agent, he would by all means recommend one. If the funds of the Association would not permit the employment of one at first, information of the constitution of the Association might be circulated by handbills, and Institutions would thus know the method in which it was proposed they should be managed. If an Institution could only secure a committee of three persons—president, secretary, and treasurer—it might partake of all the benefits of the Association. It could even establish local examinations, and so save pupils travelling perhaps miles to undergo their examination at a neighbouring Institute. Local elementary examinations had been most successful in the Yorkshire Union. The Chairman said that the East Lancashire Union had two organising masters who divided the institutes into two sections or districts, each taking a section. These masters visited the various institutions five days in a week, returning home at night, and on Saturday they gave lectures—one of a course extending over four or six weeks, according to the nature of the subject and other circumstances. One of the masters generally lectured on chemistry, and the other on mechanics, and their lectures were elementary: at any rate, they did not enter into the more recondite questions of their subject. These masters were first-class men. They were from the Diocesan Training School at Chester, where they took high certificates. The resources of the Union were derived from fees of pupils, who paid 2d. or 3d. a week, and from local subscriptions. In addition to the local funds they had a central fund, which belonged to the Union. This fund was contributed by some of the principal gentry and trading firms of the district, and amounted to about, he thought, £200 a year. It was expended in the payment of part of the salary of the masters, the remainder being advanced by those institutions that had the benefit of their instruction. The institution had also to pay £5 for what was termed a candidate teacher, and £10 for a local teacher. The Union had also the benefit of voluntary assistance from gentlemen such as Mr. Wilkinson, of Burnley. One or two of the institutions were conducted without the aid of the organising master, and others were too feeble to receive his visits. If, however, the Union was satisfied those institutes were not sluggishly conducted, they were not deprived of the benefit of sending pupils for examination. The basis of those examinations was to ascertain whether or not the candidates had a good elementary knowledge. Any other plan of examination would be erroneous. With regard to the constitution of the Lancashire and Cheshire Association, they either might have a central fund for the whole Union, as in the East Lancashire Association, or they might divide their district into separate unions, each having a central fund, and the central fund of the association might be looked on as subsidiary to them. The itinerating library, agent, lectures, and diagrams were all important subjects, which he was sure the council would consider. After some further discussion, Dr. J. Watts proposed the following series of resolutions:—1. That it is desirable that a general council be constituted, composed of eminent men in the two counties. 2. That an executive be formed, selected chiefly from the general council. 3. That the various institutions in union be grouped into sub-unions, with a council for each group. 4. That, for the improvement of class instruction it is desirable, in addition to the services of a general agent, to employ itinerating teachers for special subjects in the various groups of institutions for aiding and superintending the class organisation. 5. That a general system of examination for the whole of the institutions in union be adopted. 6. That efforts be made to enlarge the itinerating library, and to found an itinerating art exhibition. 7. That attention be directed to the formation of a scheme of honorary and paid lecturers. 8. That special attention be directed to the promotion of examinations of the Department of Science and Art, and of the Society of Arts. 9. That the above resolutions, with such alterations and modifications as the present council may deem necessary or desirable, be submitted for adoption to the delegates at the next annual meeting. These resolutions were seconded by Mr. Traice, and adopted. The proceedings closed with votes of thanks to Sir J. Kay-Shuttleworth, and Messrs. Hole and Blake, for the information they had given to the conference, and to the chairman for presiding.

Macclesfield Useful Knowledge Society.—The twenty-seventh annual report says that the Committee cannot congratulate the members upon a revival of the trade of the town, and the consequent improvement in the affairs of the Society which would have followed such a revival. They have not, however, reposed on their oars during the past year, but they have, to the best of their ability, been active in improving the condition of the Institution, the whole of its internal arrangements having been the subject of their serious consideration. They have secured the services of Mr. Hancock (an active and energetic teacher) in conducting the Chemistry and English Literature Classes, the former of which they have re-established. They have re-established the Drawing Class, and they have formed a Singing Class on the Tonic Sol-fa system; a Working Men's French Class, and a class for the instruction of the members in silk manufactures. In effecting these arrangements they beg to acknowledge the invaluable aid and counsel they have received from Mr. Greg, to whom the Society owes a deep debt of gratitude for his exertions. The following tabular statement will show the number and average attendance of the members in their respective classes as now constituted:—

Description of Class.	No. of Membs.	Average Attendance
Arithmetic	52	18
Reading and writing	35	18
Grammar	44	10
Chemistry	48	22
English Literature	41	20

Stenography	12	6
Drawing	23	16
French	34	30
Singing	48	34
Female (reading, writing, and arithmetic)	45	28
Female (sewing)	32	19
Juvenile	72	52

This attendance would have been considerably larger had not the distressed state of the town prevented many of the poorer members from availing themselves of the benefits of the Institution. As an inducement for temporary residents to become members, the Committee have adopted the system of quarterly and monthly payments to the reading-room. The Committee, after giving the names of the holders of prizes and certificates from the Society of Arts, report that E. C. Egerton, Esq., M.P., has kindly redeemed his promise in using his influence in favour of James Mottram, a prize recipient at the last annual meeting, by procuring him a clerkship on the Great Northern Railway. The Committee are glad to report the continued prosperity of the reading-room and library; for the former they have prepared and brought into use a new code of rules, which work advantageously. The library has been increased by about 100 volumes, as many as the funds of the Society would permit the Committee to purchase. The number of volumes circulated during the year ending the 30th August last has been about 14,000. The Committee thank their President for kindly furnishing them with various parliamentary papers. In February last, Mr. Buckmaster, from the Science and Art Department at Kensington, delivered an interesting lecture on the "Minutes of Council on Education." The Committee have had two concerts during the year.

THIRSK MECHANICS' INSTITUTE.—The eighteenth annual report congratulates the members and friends of the Institution on its satisfactory position. The reading-room continues to be well attended, affording a constant source of entertainment and instruction. The library is now open to the members twice a week. This fact, taken in connection with the addition of the works which the committee have introduced, proves that it is becoming more thoroughly appreciated. The circulation of books for the past year has been 3,353 being an increase of 887 over the previous year. The committee have purchased and added to the library 76 volumes, together with 12 volumes of magazines. The number of members has slightly increased, and is for the past and two preceding years as follows:—1860, 147; 1861, 153; 1852, 164. The free-hand and architectural drawing class is resumed under the superintendence of Mr. Bourne, and will prove most valuable to that portion of the members following, or intending to follow, architectural pursuits. The report refers to the success of the candidates belonging to the Institute, in the elementary examinations on the papers issued by the "Central Committee," and recommends these examinations to the special attention of its members. The balance sheet shows that the finances of the Institute are in a favourable condition. The receipts have been £87 19s. 5d.; and the balance in hand is £11 12s. 1d.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August 28th*, 1863.]

Dated 31st July, 1863.

1894. J. C. Haddan, Bessborough-gardens, Pimlico—Imp. in fire-arms, and in artillery and projectiles for the same.

Dated 6th August, 1863.

1938. J. G. Pinède, Liancourt, France—Imp. in apparatus for regulating the speed of steam and hydraulic engines.
1947. T. Simmelkiar, Black Rock, Cork, and J. I. Spicer, Park-road, Old Ford, Middlesex—An improved composition for coating or painting the bottoms of ships or vessels to prevent them from fouling.

Dated 10th August, 1863.

1968. P. Marcos del Rio, Jermyn-street, St. James'—A new machine for obtaining motive power.

Dated 13th August, 1863.

2000. J. Edmunds, Birmingham—An imp. or imps. in gun and pistol furniture.
2004. M. A. F. Mennons, Abingdon Chambers, Westminster—Imp. in the construction of numbering machines. (A com.)
2006. H. Brown, King-street, Cheapside—Imp. in burners for lamps for burning oils or fluids.

Dated 14th August, 1863.

2010. R. B. Greenwood, 416, Hackney-road—Improved means of preventing accidents upon railways.
2012. E. B. Wilson, 5, Parliament-street, Westminster—Imp. in blast furnaces.
2016. N. S. Russell, Great George-street, Westminster—Imp. in apparatus for working great guns.
2018. W. Asbury, Birmingham—Imp. in axles and axle-boxes and the parts of wheels immediately connected therewith.

Dated 15th August, 1863.

2022. G. Davies, 1, Serle-street, Lincoln's inn—Imp. in furnaces for heating, flattening, and annealing glass. (A com.)
2024. R. Parker, Atherton, Lancashire—Certain imp. in presser flyers to be employed in preparing, spinning, and doubling cotton and other fibrous materials.
2026. E. Lord, Todmorden, Yorkshire—Certain imp. in machinery for preparing, spinning, and doubling cotton and other fibrous substances.
2028. J. E. F. Ludeke, 2, Elizabeth-terrace, Islington—Imp. in the means of keeping cameras or other apparatus steady when suspended to balloons.
2032. R. Lightbown, Over Darwen, Lancashire—Imp. in looms for weaving.
2034. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of cement. (A com.)

Dated 17th August, 1863.

2036. J. Smith, Cheetham, Manchester—Imp. in machinery for finishing woven fabrics.
2040. W. Longbottom, Barnsley, Yorkshire—An improved lubricator.

PATENTS SEALED.

[*From Gazette, September 1st*, 1863.]

29th August.

577. O. Murrell.
580. A. F. Pagny.
581. G. Hawksley and T. Bissell.
584. C. Garton.
587. T. E. Symonds.
590. G. F. Lyster.
594. G. Price and W. Dawes.
601. J. Pollard.
602. C. M. Palmer & J. McIntyre.
603. J. F. Gits.
606. T. H. Morrell and J. Williamson.
607. E. A. Wunsch.
615. W. Whittle.
616. T. Thornton, E. Thornton, and R. Thornton.
622. W. Jackson & R. Watkins.
623. S. H. Foster, T. Bunney, and J. Anderson.
624. J. Miller.
627. J. Howie.
628. W. Clark.
629. J. Elsey.
632. W. H. Buckland.
634. A. Cuthell.
635. A. W. Makinson.
640. T. Hancock.
642. T. G. Webb.
646. R. Mushet.
647. J. Cowley.
648. H. A. Bonneville.
651. C. H. Lea.
652. W. Inglis.
656. J. R. Gorst.
657. W. E. Newton.
693. J. W. McCarter.
697. W. Young.
702. F. Hoyos.
706. T. Powell.
730. F. Norrington.
778. J. Leach and J. Anderson.
779. J. H. Warrall.
795. G. Davies.
805. W. Clark.
842. G. T. Bousfield.
885. J. N. Brown.
1048. J. J. Robert.
1058. H. Beare.
1180. C. L. Van Tenac.
1291. A. W. Hofmann.
1390. J. J. McComb.
1478. G. Davies.
1513. W. H. Dawes.
1594. J. L. Hughes.
1643. G. T. Bousfield.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, September 1st*, 1863.]

24th August.

2047. W. Thomson and F. Jenkin.
2062. G. T. Bousfield.
2063. G. T. Bousfield.
2071. P. Effertz.

25th August.

2131. J. Hughes, W. Williams, and G. Leyshon.
2475. J. Silvester.

26th August.

2068. J. Bingley.
2074. C. W. Siemens.
2089. Sir P. Fairbairn.

28th August.

2100. W. S. Underhill.
2128. T. Grimston.
2175. E. Horton.

29th August.

2096. J. H. Johnson.
2124. H. Moore and S. Newberry.
2190. G. Wellman.

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, September 1st*, 1863.]

28th August.

2037. J. Apperly.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 11, 1863.

NOTICE TO INSTITUTIONS.

The Programme of the Examinations for 1864 is now ready, and may be had *gratis*, on application to the Secretary of the Society of Arts.

The Papers set at the Final Examinations held in May last are also published, and may be had of the Society's publishers, Messrs. Bell and Daldy, Fleet-street, price sixpence.

BRITISH GUIANA AT THE INTERNATIONAL EXHIBITION.

At the Local Exhibition of the Natural History Society of British Guiana, held at George Town on the 1st ult., the Hon. W. Walker—President of the Society, and Chairman of the Committee of Correspondence of the Royal Agricultural Society of the Colony, which has been chiefly instrumental throughout in collecting and forwarding specimens for the various International Exhibitions—distributed the medals and honourable mentions awarded at the London International Exhibition to the successful exhibitors. On that occasion Sir W. H. Holmes, the Colonial Commissioner, who acted in London for British Guiana, submitted a very interesting report, from which the following extracts are taken:—

Little is known in England of our colony. It is generally classed amongst the West Indian Islands; indeed, it is often quoted as an island. Few are aware of the relative positions of Demerara and Guiana, for it appears that the county is far better known than the province. Our geography, history, or productions, even among the educated classes, are comparatively ignored. Unless intimately connected with the colony few had any idea that the area of British Guiana exceeds that of Great Britain; that its climate, though tropical, is salubrious—that it is watered by gigantic rivers whose sources are far away in the untrodden regions of the empire of Brazil, or in the Republic of Venezuela—that thse rivers and their tributaries form a net-work of internal navigation unparalleled in other countries, and flow through thousands of miles of virgin forests, through territories abounding in tropical productions, and through soils of wonderful fertility—that our Flora and Fauna are still but partially determined, while our mineral resources have as yet been left unexamined; in fact, that but a mere edging of our vast territories is settled or cultivated—yet this portion, in 1861, exported over 70,000 hhds. of sugar, 30,000 puns. rum, and about a million cubic feet of timber, valued in round numbers at £1,500,000. Taking our population at 150,000, this shows an export of £10 per head derived solely from the produce of the soil, more than double that of manufacturing England. In many instances, those to whom I related this state of affairs were rather incredulous, and it was only after investigating the map of South America, and examining our contributions, that they began to realise the value and resources of the colony. To the ordinary visitor—I fear to some of our colonists—the collection exhibited appeared, with the exception perhaps of the specimens of natural history, but little attractive. Samples of sugar, vials of rum, bottles of all sizes containing specimens of flour, starches, oils, pigments, rough barks, fragments of fibre, samples of gutta percha, caoutchouc, and slabs of timber, were hurriedly glanced at by the generality of visitors.

But in England, where trade is subdivided into systems of "specialities," almost every article became the object of minute investigation. Thus in turn the merchant, manufacturer, chemist, artist, and, though last not least, the amateur, were eager inquirers as to the price, quantity, quality, and when and on what terms such an article could be delivered.

It was at this point I was obliged to admit that, although every article could be produced or obtained in large quantities, that labour was scarce, and fully occupied in cultivating the recognised staple; that many parts of our land were difficult of approach, and that, consequently, it would not be very easy to obtain many articles in such quantities as were desired.

The specimens we exhibited were necessarily small, and the universal cry was for larger samples, "about a hundred-weight" was required to adapt machinery, and to enable a thorough investigation to be carried out. We are all here aware how difficult it would be to supply such an amount of many of the things we exhibited, and it is at this stage that Government or some other extraneous aid becomes necessary, if we are desirous of introducing new materials into our general commerce.

I shall now proceed to notice the awards of the Juries. British Guiana received 38 medals and 19 honourable mentions, in all 57 prizes. In this respect we were fourth on the list of British colonies, a position of which I think we may be justly proud, when we take into consideration the wealth and population of Canada and of the Australian colonies, and the great preparations and outlay which they made to be adequately represented. For instance, the timber trophy of one of the minor of these colonies cost more than the whole expenses of our department in England. In reviewing the awards of the Juries, I shall, for convenience of reference, adhere to the divisions or sections of the local catalogue.

Saccharine Products and Articles of Food.—Under this section we received nineteen medals and eight honourable mentions. Six medals were awarded to our principal staple, sugar. The vacuum pan descriptions were considered as good in colour and quality as it was possible to make under this particular process. There was a specimen from the Mauritius, the grain of which was as large as the ordinary crystals of sugar candy; it received a medal, but it was more a fancy article than one required for general purposes. Ordinary muscavado from Cuming's Lodge estate was awarded a medal, and compared not unfavourably with the best qualities of Barbadoes sugar in its immediate vicinity.

Rum.—Five medals and five honourable mentions were awarded to this article. Our qualities ranked next to those from Jamaica, which always command the highest prices, indeed rum seems a sort of "speciality" of that island; the distilleries there are not on so large a scale as ours. The superiority of the spirit seems, in a great measure, due to the care in its preparation, and to an abundant supply of running water.

Boughton's Curaçoa, composed of pure spirit, sugar, and fruits, obtained a medal; it was remarkable for its fragrance, and was considered by the Jury about the most successful liqueur exhibited, a verdict practically borne out by public opinion, for all the samples so rapidly disappeared that it was found advisable to substitute dummy bottles for the veritable compound.

The series of flours, farinas, meals and starches exhibited received five medals—four of which were awarded to our farmers. It is remarkable how little appreciated these articles are in a colony that annually imports 70,000 to 80,000 barrels of flour, yet in England plantain meal and the flours of the sweet and bitter cassava were found to make excellent bread and pastry—as food for children and the invalid they cannot be surpassed—and after six months' exposure in the Exhibition buildings their qualities were found unimpaired. To such an extent

could flours and meals from the "roots and fruits" of Guiana be produced, that in the event of the cereals being overtaken by such diseases as have striken the vine and potatoe, it is not perhaps too much to say that nature has provided in this part of the world the means of mitigating so fearful a dearth.

Rice.—Although no medal was awarded, our specimens were highly commended; and it may not be out of place here to state that rice from Guiana on a former occasion on its first appearance in the London market commanded higher prices than the best Carolina.

This colony is now dependent on a single staple, and that recognised as one of the most fluctuating—yet there is not, perhaps in the world, a country so adapted for the cultivation of rice as British Guiana, seeing that, with a tropical climate, it consists of flat alluvial soil of great fertility with an unlimited supply of fresh water for irrigation. Considering that this grain forms the principal food of certainly one-half of the population of the globe, and that we, at great cost, annually import sixty to seventy thousand bags, the importance of this cereal to us cannot be over estimated. I believe by well regulated action there is ample labour to be had, which, applied to its cultivation, would relieve us of the drain occasioned by its purchase abroad.

Cassareep is well known to be the chief ingredient of many of the best sauces, and five to six shillings a bottle is the usual price in London for this condiment. It may not be uninteresting to mention that "pepperpot" was considered about the most successful dish at the Acclimatization Society's great dinner, where luxuries from all parts of the world were introduced.

Judging from the desire in England to obtain good Cayenne pepper, preserves, capsicums, hot pickles, and succades, especially guava jelly, the specimens of which were much approved, I should think some suitable occupation might be found for a class of persons who, incapable of field work, appear to be in a chronic state of want in this colony, namely, unemployed females, seeing that fruit and other ingredients are to be had almost for the gathering, and that sugar is as cheap as in any other part of the world, while our export list shows but a very limited number of small packages of such articles, I would call public attention to a resource only requiring some care and attention to secure a livelihood for a number of persons.

Fibrous substances received six medals and four honourable mentions; the majority of these were awarded to cotton. This colony is so renowned for the produce of this staple, that although for many years we have ceased to export a single bale, "Demerary cotton" remains stereotyped in the Liverpool Prices Current, and occupies a place next to Sea Island. The samples exhibited quite kept up our former repute, and afforded a variety of qualities, from the silky green seed to the coarse qualities of inland obtained from the Macusi Indians. These much resemble what in the trade are called "Bowed Georgias," and are in great demand for general purposes. It is unnecessary to make further remarks about cotton. It is generally known here that we have an unlimited amount of most suitable land for the growth of this plant; in fact, if we had hands, British Guiana alone could supply the demands of the English market. Eleven other fibres were exhibited, every one of which was considered valuable, averaging from £20 to £10 a ton. It is most unfortunate that we have not hitherto been able to utilise the fibre of the plantain, whose fruit may be said to be the staple food of the colony. Thousands of tons of this material are annually allowed to rot on the ground, and yet a very complete and not expensive machine was exhibited, with which the writer with his own hands readily obtained from a banana tree, kindly contributed for the experiment by Sir W. Hooker, from the Royal Gardens at Kew, fibre valued at £40 a ton. Mr. Manifold, Civil Engineer, has all the details of this machine, and is in a position to order it from the patentee. The cost is something under £50.

To Chemical and Pharmaceutical Articles five medals and five honourable mentions were awarded. For a colony possessing such extensive territories, consisting, as they do for the greater part, of unexplored tropical forest, this section opens out so vast a field, that it would be impossible in a paper of this sort even to attempt to enumerate the various drugs, resins, gums, dyes, oils, and waxes, that could be obtained from this almost inexhaustible source. Suffice it to say, that Mr. C. Hunter, Surgeon to the Royal Dispensary, Pimlico, under the auspices of that most estimable lady, Miss Burdett Coutts (to whose interest in this colony, as shown by this and other acts, I may here pay a passing tribute), undertook to examine the medical and pharmaceutical contributions, which he describes "as allowed to repose unlooked at, save by a few, in the retired corners of the various courts, if not carefully sought for—not in catalogues, as they were seldom mentioned in them—but in the recesses of the courts." His investigations were chiefly confined to a series of 140 barks contributed by the authorities of British Guiana, but collected by Mr. M'Clintock in the Pomeroon and neighbouring rivers, and said to be in use amongst Indian tribes who inhabit their banks. The result is an interesting pamphlet, which the Committee consider of such value that they have despatched the colonial botanist, Mr. Appun, to obtain larger supplies for further examination. In proof of the utility of the International Exhibition, if such be necessary, I may be allowed to say it determined the value of that new material which, I trust, may ere long be numbered amongst the exports of the colony—I allude to Balata, or juice of the Bullet-tree. This article, combining qualities of caoutchouc and gutta-percha, may possibly be found to supply the great want of the day as a satisfactory insulator, for which purpose there are objections both to India-rubber and gutta-percha. At any rate, it is valued at one shilling and sixpence per pound; and, at this moment, some fifty Indians, who would otherwise be useless to the colony, are obtaining liberal wages to collect it.

Of Woods for Building and other Purposes, we exhibited about 130 different varieties, but as they were shown in collections, only two medals and one honourable mention were awarded. No material is so difficult to bring into general use as new varieties of timber, seeing that the stability and durability of the constructions for which it is used are dependent on the quality employed. Architects therefore naturally hesitate to use untried sorts, while an adequate supply of well-known timber is to be had. Teak from India commands the market. While possessing most of the qualities of our hard wood, it is lighter and easily worked, and contains an essential oil which rather preserves than deteriorates iron. Greenheart is certainly next in rank. In 1861 about a million cubic feet were shipped to the English market; this large supply, combined with other causes, tended to bring down prices, but at the same time introduced it into many new undertakings, so that stocks did not accumulate, and I have no doubt laid the foundation for a continuous demand. Some interesting trials were made by the London and North Western Company, of greenheart for railway purposes; these were so satisfactory that, having been kindly furnished with copies by Mr. Tinne, of Liverpool, I addressed circulars to most of the railway companies in Great Britain, I trust with some success, as I have learned since my return that some large contracts have been taken up by them. Mora and greenheart are admitted at Lloyd's among the seven or eight woods from all parts of the world recognised as first-class, and they are allowed by this Association to be used in the construction of ships of the "best letter"—mora is little shipped from local causes. No doubt many woods exhibited were of as good a quality as either greenheart or mora, but it takes many years to establish new descriptions in the English markets, and unfortunately local reputation is of little avail. As collections, our woods were much admired, especially those varieties which appeared suitable for furniture; but

among cabinet-makers, as among the more important branches of business, there are recognised woods—such as mahogany, rosewood, and walnut—to which they and their customers are accustomed, and which they will not leave, except especially ordered to do so. Mr. Andrew Hunter exhibited a piece of letterwood which obtained a prize; it was supposed to be the most beautiful specimen at the Exhibition. Captain Fowke, of the Royal Engineers, having undertaken to make a series of experiments on woods from all parts of the world, I furnished him with specimens of most of ours, the results of which, when completed, will be laid before Parliament, and will be distributed in the shape of a Blue Book to the public, and to various countries and colonies whose woods have been contributed. Before leaving England, I ascertained that greenheart retained its high place on the list of the most valuable timbers known.

Indian Manufactures and Miscellaneous Articles.—The specimens exhibited under this section were more intended for decoration, and as curiosities to illustrate the habits and peculiarities of an interesting, gentle, but waning race, than to compete with the choice fabrics of the civilised world. In their way they attracted considerable attention, and the basket-work from Pomeroon deservedly gained a medal. It is a curious coincidence that the designs of the Pegalls are nearly fac-similies of the patterns as seen on Etruscan tombs and pottery, perhaps the earliest specimens of European art. The Matapis or Cassava squeezer has a description of power, apparently unknown in England; its ingenuity excited some surprise, and several mechanics took a note of these instruments for practical purposes.

Natural History—Seeds and Imitation of Fruits.—This section in the Exhibition Catalogue came under Class 29, "Educational Works and Appliances;" although specimens of natural history may scarce be considered legitimate in an industrial and fine art Exhibition, our department would have been deprived of its most attractive characteristics had it not been for the munificent contribution of Mr. Alpin Grant and the collection of butterflies, reptiles, and insects of Dr. Whitlock, Messrs. Erhardt and Appun. These were by far the most popular with the multitude, and rich as our collection was in utilitarian articles our department would often have been left unobserved had it not been for the "Kaleidoscopic" colour of our birds and butterflies—nor are these to be despised in a commercial point of view, as naturalists were very desirous to contract for supplies of birds of brilliant plumage, for the fashion of the day had adopted them as suitable ornaments for ladies and children's hats; emperor butterflies were also in great demand for the evening head dresses of our fair countrywomen. For these insects, and for good skins of the scarlet Ibis (currie currie), five to seven shillings each were freely offered. The natural history contributions of Mr. Grant, Dr. Whitlock, and Messrs. Erhardt and Appun, were rewarded by medals. Mr. Mattis, of Surinam, also received a similar prize for his very clever imitations in a new material of tropical fruits and vegetables.

It will be observed that as our country is principally remarkable for natural productions, only a very few rewards were given for "excellence of workmanship;" amongst these must be reckoned basket-work by the Indians and a table made by Mr. Delph—considering that the furniture class at the International Exhibition was perhaps more replete than any other, it is no small credit to Mr. Delph that in competition with the first manufacturers he should have obtained an "honourable mention" for the specimen he exhibited.

NATIONAL ASSOCIATION FOR THE PROMOTION OF SOCIAL SCIENCE.

The seventh annual meeting will be held in Edinburgh, commencing Wednesday, 7th October, 1863, and concluding on Wednesday, the 14th October. *President*—The Right Hon. Lord Brougham. *Vice-Presidents*—The Right Hon. the Lord Provost of Edinburgh; the Right Hon. the Lord President of the Court of Session; the Right. Hon. the Lord Advocate; Sir David Brewster, F.R.S., L. & E., Principal of the University; Adam Black, Esq., M.P. *General Secretary*—George W. Hastings, Esq. *Local Secretaries*—Professor Archer, F.R.S.E.; Professor Douglas Maclagan, M.D., F.R.S.E.; Alexander S. Kinnear, Esq. Local Office, the City Chambers; General Reception Room, the Parliament House.

The order of proceedings is as follows:—

Wednesday, October 7th, 3 p.m.—Meeting of the Council in the Upper Library of the Society of Writers to the Signet. 8·30 p.m.—General Meeting of Members and Associates in the Free Church Assembly Hall. The Opening Address will be delivered by the Right Hon. Lord Brougham.

Thursday, October 8th, 10·30 a.m.—The President of the First (Jurisprudence) Department will deliver an Address to Members and Associates in the Free Church Assembly Hall. Immediately thereafter the business of the several Departments will commence in the Section Rooms in the Parliament House and Assembly Hall appropriated to their use, when Papers will be read, and discussions taken on the subjects embraced under each. Business of the Departments to close each day at 4 p.m., except when stated otherwise. 8 p.m.—Conversazione in the University, on the invitation of the Principal and Professors. Open to Members and Associates.

Friday, October 9th, 10·30 a.m.—The President of the Second (Education) Department will deliver an Address to Members and Associates in the Free Church Assembly Hall, immediately after which the business of the Departments will be resumed. 8 p.m.—A Working Men's Meeting will be held, when Lord Brougham and other leading members of the Association will be present. Admission by ticket, price 6d. each; the distribution of tickets to be under the charge of a Committee specially appointed for the purpose. 8 p.m.—The Industrial Museum will be opened for promenade to Members and Associates. 8 p.m.—A Conversazione in the Museum and Hall of the Royal College of Surgeons.

Saturday, October 10th, 10·30 a.m.—The President of the Third (Punishment and Reformation) Department will deliver an Address to Members and Associates in the Free Church Assembly Hall, immediately after which the business of the Departments will be continued until 2 p.m.

Monday, October 12th, 10·30 a.m.—The President of the Fourth (Public Health) Department will deliver an Address to Members and Associates in the Free Church Assembly Hall, immediately after which the business of the Departments will proceed as before. 8 p.m.—A Conversazione in the National Gallery, on the invitation of H. M. Commissioners of the Board of Trustees for Manufactures, in which the Royal Scottish Academy will co-operate, by making an Exhibition of Scottish Art on the walls of the Royal Scottish Academy Rooms.

Tuesday, October 13th, 10·30 a.m.—The President of the Fifth (Social Economy) Department will Address the Members and Associates in the Free Church Assembly Hall, after which the business of the Department will be continued. 7 p.m.—Members and friends will dine together in the Music-hall, Lord Brougham presiding. Tickets, Gentlemen 10s. 6d., Ladies 7s. 6d., may be obtained in the Reception Room, Parliament House.

Wednesday, October 14th, 12 a.m.—The President of the Sixth (Trade and International Law) Department will Address the Members and Associates in the Free Church Assembly Hall. At 2 p.m. the General Council will meet in the Upper Library of the Writers to the Signet, and at 3 p.m. the concluding General Meeting will be held in the Assembly Hall, High-street.

GOLD IN THE HUDSON'S BAY TERRITORIES.

(From the *Toronto Globe*, 28th July, 1863.)

We have to communicate to our readers to-day intelligence which, if fully established by further examination and inquiry, will add new life to the zeal of the Nor'-Western adventurers, and hasten the opening up of the territory at a rate which will outrun the anticipations of the most sanguine. For some time it has been known that gold was to be found on the Saskatchewan River, near the Rocky Mountains, and it was presumed that it had been washed by the river from the gold-bearing rocks of these mountains, and would consequently be found only in the beds of the rivers, and not elsewhere in the territory. Recent discoveries indicate that this view of the matter is not correct, and that in order to find the gold of the North-West, it will not be necessary to traverse the whole breadth of the great plains to the head waters of the Saskatchewan. Gold has been discovered at Fort Ellice on the Assiniboine, and also on the branches of the Qu'Appelle River, streams which unite and run into the Red River, and have no connection with the Rocky Mountain range. Of this fact there can be no doubt. It is not only communicated by letter from Red River, but Governor Dallas, of the Hudson's Bay Company, who has recently arrived from the territory, is personally cognisant of the discovery. The question arises: From whence comes this gold?—where lie the rocks from which it has been displaced? Professor Hind, of this city, who explored the country for our Government in 1858, supplies an answer. He says, in his report, that he discovered in St. Martin's Lake, a small sheet of water lying between Lakes Wanitoba and Winnipeg, gneissoid rocks, traversed by quartz and felspathic veins, and that these being gold-bearing rocks he searched for it, but nothing was found, probably owing to the lack of time. The deduction which he now draws from the discovery of gold on the plains of the Assiniboine is, that the precious metal has been conveyed with the drift from ranges of gold-bearing rocks, running parallel with the Lake Winnipeg basin, and the Laurentian formation on the eastern side of the lake and extending to the North-West beyond Lake Arthabasca. He considers it certain that all over the drift of the plains, from Lake Maintoba to the Rocky Mountains, gold will be found, though, as a matter of course, the wideness of the field can only be ascertained by actual mining operations.

We understand that Governor Dallas washed gold with his own hands at Fort Edmonton on the Saskatchewan, and, in further proof of the existence of the precious metal, we may add that large numbers of the Selkirk people have gone west to enter upon regular mining operations. We see no reason to doubt that the whole of these vast plains will very soon be covered by a busy population. The means of communication alone are wanting, and we are happy to learn that the new Hudson's Bay Company contemplates a very speedy opening up of the territory. It is hoped that steamboats will be running on the Saskatchewan within a year from the present date. The plans of the company contemplate also, in spite of their prospectus, the immediate assumption by the Crown of the whole region lying between Lake Winnipeg and the Rocky Mountains, south of Lake and River Arthabasca, with the exception of such portion (reported to be every alternate section) as will be devoted to repay the Company for opening the communication by common roads, and steamers on the rivers from Lake Superior to the Rocky Mountains, and afterwards by a railway, which, it is hoped, will be finished within ten years. Further explanations of the plans for the government of the country and other matters will doubtless be speedily afforded to the Government, and duly weighed by them. The prospect of the realisation of our long-indulged hopes of the opening up of the territory seems, however, to be very favourable.

We have received the Red River *Nor'-Wester* of June 30 and July 15. They contain but little of general news, but the following with regard to the gold fields and farming prospects of the Saskatchewan is of interest:—

(From the *Nor'-Wester*, June 30.)

We have received a letter from Mr. George Flett, dated Saskatchewan, 10th May, 1863, from which we make the following extracts:—

"I have written to you many letters, and I know that you have not received all of them. One, sending for some supplies, was sent back from Carlton. Letters to me are not, I imagine, forwarded very regularly either; for I have only received four in all since I came here, and none at all during the winter, although Mr. H. M'Beath and others to whom letters have been written have received them three times this winter.

"The past winter was a very mild one. There was so little snow that we had only one month of good hauling. On the 9th of April we left our comfortable winter house to go to Mud Fort, about fifty-five miles above Edmonton by land, and between seventy and eighty by water. We reached our destination on the 15th, and on the 23rd we set our rockers under way. Not having any quicksilver we cannot tell you exactly the amount we make per day per man; but Mr. Love and Mr. Atkinson, old miners, are satisfied that we make from 8s. to 10s. per day.

"Gold is to be found in almost every point or bar, to pay from 6s to 8s. per day, and before next Fall you will hear good news from the Saskatchewan mines. News from Peace River and other places near the mountains on this side is very cheering. Five hundred miners from the west have crossed the mountains to mine on this side, and those at Peace River are represented to have found gold in great quantities, but they are badly off for provisions. Flour is 1 dol. 50 cents per lb., and everything else in proportion. One hundred of these miners propose to come here this summer for provisions, and if they cannot get enough they are going to Red River for their supplies.

"George Gunn and myself left the miners for some time to farm. We put down nine bushels of wheat and barley, and after our horses and oxen rest a few days, we are going to plough with two ploughs for a month. We know that if we have grain or flour the gold will come to us. As in all new gold districts, there are here too many gold-seekers for the number of provision gatherers.

"In richness of soil this country cannot be beaten. Indeed there is every encouragement in the soil, climate, and demand for agricultural products to induce settlers to come here. For trading even among the Indians, flour is better than goods, and the parties who raise it here would, of course, save freight, while they realised the highest prices going—which are high enough in all conscience. If a good millwright were to come to this place, and bring a pair of millstones and the necessary iron, he would do a great business by running a mill. There are several people who propose going to Red River for ploughs, who intend to commence farming on their return. Mill streams with good stone bottoms are, I may mention, plenty. There is a great demand for cows.

"As an instance of the profit of farming, I would state that I saw a man coming home from the plains with several horse trains, loaded with pounded meat and grease that he bought from the Crees in barter, for little or nothing. Two bushels of potatoes sold to the Indians will load a horse sled; for one turnip you will get a bladder of grease; for ten quarts of good flour you will get 100 lb. of provisions; and you can get buffalo robes and furs generally for flour, at similarly cheap rates—cheaper than for goods."

(From the *Nor' Wester*—editorial—July 15.)

That gold existed in paying quantities of the eastern as well as the western slopes of the Rocky Mountains, was, until 1861, pretty much a mere theory. The probability was that the opinion was correct; but up to that time no practised miner had sought for the precious metal on this side.

At length the welcome intelligence of the Saskatchewan mines broke in upon us, and we were told that gold would pay for the digging, even as far down the river as Edmonton. Subsequently we had the most reliable intelligence confirming this good news, with the addition that diggings at Edmonton had paid five dollars per diem with the rocker.

This intelligence so wrought upon our own community and upon the people of Canada that a considerable number of fortune-seekers left this for the mines the following spring. The great body of these were, it is well known, Canadians, who came hither so much under the inspiration of the London *Times* correspondent's letters respecting Carriboo, that they had no patience to linger on the road testing other mines. Five dollars a day was a very slow old-fashioned rate of money-making to those whose imaginations were excited with glowing pictures of "the largest gold field in the world;" and most of them having determined to go where wonderful discoveries had just been made, they crossed the mountains.

Our people resisted the allurements of the Carriboo region, and remained among the prospectors on this side, being convinced that the diggings were, at least, worth a trial. The result is worthy of record. With but little mining experience—only two or three being regular miners—and withal so few in numbers that the prospecting was necessarily confined to a very limited area—these pioneer miners must be regarded as having been very successful.

Most of the rivers that have been examined—the Peace River, Saskatchewan, Clearwater, and others—have proved to be auriferous even with the most hasty, superficial testing; and miners whose experience has been gathered in California and elsewhere express themselves quite satisfied with the prospects of rich yields, while even novices assert that under all the circumstances they are better off than they were here.

We have lately had information from the vicinity of Edmonton to the effect that in three days four men washed out £80 sterling worth of gold dust. And from other quarters we have received reliable accounts of a very cheering nature. The gold-fields—although worked for the most part, as we have said, by inexperienced hands, have turned out far better than we expected. Such had been the richness of the Peace River diggings indeed, that, at last accounts, hundreds of miners from the western side had been attracted to them. Large numbers had also recently arrived at the mines on the Missouri, and were working them with wonderful results. Altogether, the mines on this side are proving so lucrative as to attract very general attention; and we hope that before long they will be thoroughly tested.

It must be borne in mind that, after all, the great importance of the recent discoveries on the Saskatchewan and other rivers lies in the indication they give of larger and richer deposits. On hearing of these discoveries, Dr. Hector, who accompanied the Palliser exploring expedition, gave it as his opinion that the gold deposits had been washed from the shingle-terraces along the eastern base of the mountains, where, it is believed, the precious metal will be found in the greatest abundance. The geologist and the miner alike point to them as the sources of the richest deposits.

As if still further to stimulate the progress of gold-hunting in Rupert's Land, we have had renewed and repeated assurances of the great agricultural capabilities of the valley of the Saskatchewan. Blessed with a fertile soil and genial climate, it is a region which holds out rare inducements to the farmer. On its plains he can raise produce cheaply, and nowhere else can he dispose of it at such an enormous profit.

With flour at 7 dollars the hundredweight, and every other agricultural product at a proportionately remunerative rate, it must be admitted that to the farmer as well as to the gold hunter this magnificent region is really a land of promise.

BRITISH ASSOCIATION, NEWCASTLE-UPON-TYNE, 1863.

On the Construction of Iron Ships, and the Progress of Iron Shipbuilding on the Tyne, Wear, and Tees. By C. A. Palmer.

The paper which I have the honour to bring under your notice to-day is limited to a brief explanation of the general principle upon which iron ships are constructed, and a short statement respecting the progress of iron shipbuilding on the Tyne, Wear, and Tees.

The art of constructing ships dates from remote antiquity, and we find in history, sacred and profane, many particulars of the ships in use in ancient times. As civilisation advanced, and the science of navigation became better understood, ships increased in size, strength, capacity, and speed. Year after year brought its improvements, century after century its changes, until the art of shipbuilding in wood approached perfection, and the rude coracles and row galleys of our forefathers had given place to the clipper ship, with its fine lines, tapering masts, and flowing canvass—the merchantman driven by steam at a high speed across the ocean, and the three-decked steam-propelled man-of-war. Then a demand arose for vessels of a still higher character—merchantmen possessing still greater speed, men of war sufficiently powerful to resist the destructive shot and shell which the genius of men, like our friend and townsman, the President of the Association, were inventing. With wood as the material to be employed, this demand could not be met; but human skill was equal to the emergency. The important discovery was made that "ships built of iron float lighter, strength for strength, than ships built of wood;" and, although for many years the prejudices of some men, and the interests of others, prevented the general adoption of the principle, it eventually triumphed, and now iron is rapidly superseding wood as a material of which ships are constructed.

The principal advantages that are claimed for ships of iron, as compared with vessels of timber, are briefly these:—

In vessels of 1,000 tons the iron ship will weigh 35 per cent. less than the timber vessel, the displacement of water being the same. The iron ship will, therefore, carry more weight, and as the sides are only about one-half of the thickness, there will, consequently, be more space for cargo. The additional strength obtainable, too, allows iron ships to be built much longer and with finer lines, thus ensuring higher sailing or steaming qualities, with greater carrying power, and therefore greater commercial results. In wooden vessels repairs of ruinous extent are frequently required, while the repairs in iron ships are generally of a lighter character, and are only needed at long intervals. An iron ship is not liable to strain in a heavy sea, whereas the straining of a timber vessel often damages a valuable cargo. The bilges of an iron ship can be kept clean and free from the disease-engendering bilge water which is always found in a wooden ship. Moreover, the use of iron masts, steel yards, and wire rigging, effects a very large saving of weight, and affords the greatest facilities for the application of patent reefing sails and other appliances, by which economy of labour is attained, and many risks of loss of human life avoided.

As to the form of building iron ships, and the manner of combining the iron so as to obtain the requisite amount of strength with the least amount of material, much difference of opinion exists among practical men. The angle iron frame and plating of the iron vessel take respectively the places of the timbers and planking of the wooden ship; and it has been found by experience that plating $\frac{1}{8}$th of an inch thick is equivalent in effect to planking of oak one inch thick, whilst plating 11-16ths of an inch thick is equal to planking of oak five inches thick. As in the largest American wooden vessels, the plank is seldom more than five inches thick, so it may be argued on the above data that the plating of the largest iron ship need not be more than 11-16ths thick; and, that any

strength required above that which such plating would give should be obtained by means of framework. Many practical men, however, advocate the system of light framework, and, in order to obtain the measure of strength necessary, the application of thicker plates. That the principle of strong framing and plating of moderate thickness is most advantageous may be shown by many facts other than those which are derived from the most modern practice of wood shipbuilding. The strength of an iron ship, as in a girder, depends on its capability to resist the buckling and tensile strains that it is called on to bear. But I believe that we have, in reality, only to make a ship strong enough to resist the buckling strain; and I am led to this conclusion by experiments conducted for that celebrated work, the Britannia-bridge, which proved that, in constructions of wrought-iron, the resistance to the tensile strain is much greater than their resistance to buckle, and, in consequence, the upper part of the girders are made much stronger than the lower part. We have, in my opinion, to make the parts of an iron ship, in principle, like a girder. A girder, however, is at rest, and the strains are always in some known direction; but in a ship whose position is ever varying, it requires to be so constructed as to resist the strains in such varied positions. If the side of a ship could remain, as in a girder, constantly vertical, then the advocates for the thick plates and small frames might be able to show that their system was the most economical way to obtain the requisite strength, but as such side, if laid over, as it is in a ship at sea, would, without support, bend or buckle of its own weight, it is evident that the framing is absolutely necessary to keep the plating firm in position, and consequently the strength of the ship depends in a very great degree on the strength of the framing. Another fact that shows the economy of strong frames, is that a plate with a piece of angle iron attached to its edge, would bear much more before buckling than a similar plate increased in thickness so as to weigh the same as the plate and angle iron. But the great and most important argument in favour of moderately thick plates and strong framing is, that all the work must be put together by hand; for though many attempts have been made to rivet ships by machinery, none seem yet to have been successful even in a mechanical point of view. So soon, therefore, as the thickness of plates and the size of the rivets pass the point at which the workmen with ordinary exertion can accomplish good work, then the attachment of the parts by means of rivetting is subject to the risks of imperfect workmanship. It is, therefore, my opinion, both in a practical and theoretical point of view, that we ought not to use plating in any vessel, however large, more than about $\frac{3}{4}$ of an inch thick.

In the early period of iron shipbuilding, the frames were generally composed of simple bars of angle iron, but they are now usually doubled by a reverse bar, which is rivetted on the principal bar, so as to make a frame, whose cross section is like the letter Z, and this form is perhaps as strong as any that could with economy be obtained. In some large ships plates of iron on edge were placed between the angle irons, so as to enlarge the section. The frame thus formed required longitudinal supports to bind it together, and those all-important strengthening pieces, called stringers, box and other keelsons were introduced. The great advantage of these appliances is that they may be placed exactly where the ship requires support, and that, too, with the least possible amount of iron. As to the application of these stringers and keelsons, the ship-builder must be guided by the form, proportions, and other circumstances connected with the construction of the ship.

To show how far this system of longitudinal framing may be carried with success, I may point to the ship *Richard Cobden*, designed by Mr. Guppy (known in connection with the construction of the *Great Britain*), in 1844. This vessel was framed so as to leave rectangular spaces to be covered with the outside plating; these spaces were $2\frac{1}{2}$ feet vertically, and 5 and 6 feet horizontally, and in no part of this highly successful construction were the plates more than $\frac{5}{8}$ths thick.

As to the riveting, which is of the utmost importance in shipbuilding, I shall say a few words. In making boilers, single riveting is usually adopted, but there the strain is constantly in one direction. In ships, the direction of the strain is changeable as the vessel moves, therefore double, and in some cases triple, riveting has been used with great advantage.

Mr. Fairbairn estimates that the tensile effect of single riveting is represented by 56, double riveting by 70, and triple riveting by 90, and these proportions would appear to hold good, whether in chain or zig-zag riveting. The former, however, has been shown by experiment to have an advantage over the latter of about 20 per cent. in the tensile strain.

In concluding this necessarily brief account of the general principle on which iron ships are constructed, I may mention that the only objections that can reasonably be urged against ships made of this material are, that the compasses are difficult of adjustment, and that the bottoms get foul. Let us, however, hope that science, in the promotion of which the British Association is so powerful an agent, may in a short time shew us how both these difficulties may be overcome.

I now proceed to what is, perhaps, the more interesting division of this paper, viz., a sketch of the progress of iron shipbuilding on the Tyne, Wear, and Tees.

For a very long period the district of the Tyne, Wear, and Tees, has been famous for its shipping. A committee of the House of Commons, that sat so far back as the year 1642, designated Newcastle as "the nursery for shipping," and Defoe, writing of the Tyne in 1727, states that "they build ships here to perfection—I mean as to strength and firmness, and to bear the sea."

The history of iron shipbuilding in this district does not commence, however, until the year 1840. In March of that year, the *John Garrow*, of Liverpool, a vessel of 800 tons burthen, the first iron ship seen in these rivers, arrived at Shields, and caused considerable excitement. A shipbuilding firm at Walker commenced to use the new material almost immediately, and on the 23rd of September, 1842, the iron steamer *Prince Albert* glided from Walker slipway into the waters of the Tyne.

During the next eight or ten years very little progress was made. The vessels mostly in demand were colliers, and no one thought of applying iron in their construction. But, about the year 1850, the carriage of coals by railway began seriously to affect the sale of north country coal in the London market, and it became essential, in the interest of the coal owners and others, to devise some means of conveying the staple produce of this district to London in an expeditious, regular, and, at the same time, economical manner. To accomplish this object, I caused an iron screw steamer to be designed in such a manner as to secure the greatest possible capacity, with engines only sufficiently powerful to secure her making her voyages with regularity. This vessel (the *John Bowes*), the first screw collier, was built to carry 650 tons, and to steam about nine miles an hour. To the success of this experiment may be attributable, in a great measure, the present important development of iron shipbuilding in this district, and the fact that we continue to supply so largely the London market with coals. On her first voyage, the *John Bowes* was laden with 650 tons of coals in four hours; in forty-eight hours she arrived in London; in twenty-four hours she discharged her cargo; and in forty-eight hours more she was again in the Tyne; so that, in five days she performed successfully an amount of work that would have taken two average-sized sailing colliers upwards of a month to accomplish.

The amount of prejudice with which nautical men, and persons engaged in the shipping and coal trades, opposed the introduction of screw colliers was great. They argued that it would be impossible for steamers carrying 650 tons

of coals, and costing about £10,000, to compete with vessels that consumed no fuel, and which, though carrying only half the quantity, cost little more than £1,000, or only one-tenth the amount. I was, however, confident of the result, and persisted in the development of the system. How far my views have proved correct will be borne out by the following table, which shows the number of cargoes and tons of coals imported into London by screw steamers in each year, from July 31, 1852 (the date of entry of the first screw steamer, *John Bowes*), to June 30, 1863:—

Year.		Cargoes.		Tons.
1852		17	making	9,483
3		123	,,	69,934
4		345	,,	199,974
5	Crimean War	174	,,	85,584
6		413	,,	238,597
7		977	,,	547,099
8		1,127	,,	599,527
9	Italian War	899	,,	544,614
1860		1,069	,,	672,476
1		1,299	,,	851,991
2		1,427	,,	929,825
3	Half-year ending June	714	,,	463,609
				5,212,713

By this table it is seen that a total quantity of 5,212,713 tons of coals have been imported into London, by screw colliers, and, in addition to this, large and increasing quantities have been taken to other ports both in this country and abroad. Since its first introduction, too, the screw collier has been greatly improved, and the facilities for loading and discharging very largely augmented. The screw collier *James Dixon* frequently receives 1,200 tons of coals in four hours, makes her passage to London in thirty-two hours; there, by means of the hydraulic machinery which our President invented, amongst the other inventions which distinguish his name, discharges her cargo in ten hours, returns in thirty-two hours, and thus completes her voyage in seventy-six hours. The *James Dixon* made fifty-seven voyages to London in one year, and in that year delivered 62,842 tons of coals, and this with a crew of only twenty-one persons. To accomplish this work on the old system, with sailing colliers, would have required sixteen ships, and one hundred and forty-four hands to man them.

One of the great difficulties we had to encounter in perfecting these vessels was in the ballasting. To dispense with the necessity of shipping shingle or chalk as ballast, many costly experiments were tried, and at length, by a system of double bottoms, the construction of which adds to the strength of the ships, the ballasting of the vessels with water was brought to a highly satisfactory result. The water is allowed to run into the spaces between the two shells as the vessels pass down the Thames; when the spaces are full the cocks are closed and so remain until the arrival in the Tyne, when the water is pumped out by means of an apparatus provided by the purpose. This system allows the vessel to be ballasted without loss of time at either end of the voyage; and does not impair in the slightest degree her power of carrying coals. The introduction of the screw collier has revolutionised the coal carrying trade, and has had a most beneficial effect upon commerce generally. Besides accomplishing the purpose for which it was designed, this class of vessel has been proved capable of rendering very important services to the Royal Navy. When in the latter part of the year 1854 information reached this country that the commissariat department of our army in the Crimea had broken down, and that the salvation of our troops depended upon a rapid despatch of supplies, it was found that screw colliers were admirably adapted for the work, and the majority of them were temporarily taken out of the coal trade and employed in the transport service. The Government admitted, on that occasion, that screw colliers had proved to be more useful and economical than any other class of vessels they had employed.

In the year following the launch of the *John Bowes*, namely, in 1853, the first iron vessel built on the Wear was loosed from its blocks. The Tees followed with great energy and considerable success, and on both those rivers, as we shall see presently, a very considerable trade in iron shipbuilding is carried on.

The first iron vessel, for war purposes, constructed in this district, was *The Terror*, one of the large iron-cased floating batteries designed, during the Russian war, to operate against Cronstadt. This vessel, of 2,000 tons, 250 horse power, carrying 26 sixty-eight pounder guns, was built in three and a half months, and she would have been completed in three months had not the declaration of peace slackened the energies of our men, which, up to that time, had been maintained so nobly by their patriotic feelings.

It was in the building of this vessel that rolled armour plates were first used. The demand for forged armour plates was so great that the forges of the kingdom could not supply it, and recourse to rolling was unavoidable. At that time the largest plate mill was at Parkgate, and we accordingly employed Messrs. Beale and Co., the owners of Parkgate works, to roll the plates we required. To the use of these rolled plates, however, the Admiralty opposed itself, but we feeling convinced, by experiments which we made, that the rolled armour plates were, at least, equal to the forged, invited the Admiralty to a trial of their efficiency.

We built a target nine feet square, on a plan which we thought might be advantageously adopted for large vessels of war, and on the cellular principle. The cells we filled with compressed cotton, which we had found by experiment to be very effectual in stopping shot. On this target was a thin teak backing, on the teak were bolted one hammered and two rolled plates. The target was bolted on to the side of an old wooden frigate at Portsmouth, under the direction of Captain Hewlett. The first shot fired at it missed the target, went through both sides of the frigate, and, to my great astonishment, skimmed over the surface of the water for nearly a mile. The firing showed that whilst the hammered plate split and cracked to pieces, the rolled plates were not broken, only indented, and were superior to the hammered plate in every respect. Unfortunately the target was not firmly bolted to the vessel, and it sprung at each shot, so that the bolts which held the armour plates were broken, and they fell into the sea.

A shot was then tried to test the resisting power of the compressed cotton, and it appeared to answer so well that Captain Hewlett advised a series of experiments to be tried. The Admiralty were willing, but required us to provide the target at our own expense. Having already spent upwards of £1,000 on experiments for the good of the country, we declined this proposal; nevertheless, we had proved to the Admiralty this important fact, that the rolled plates were superior to the forged, and they have since been universally adopted. We claim, therefore, for this district, the honour of being the first to prove the strength and utility of rolled armour plates, since known and spoken of in Parliament as "Palmer's Rolled Plates."

While on this subject of armour plates, I may, perhaps, be allowed, as the builder of the iron-plated frigate *Defence*, to make a slight digression in order to express an opinion upon the class of marine architecture to which that vessel belongs. The *Defence*, although in every respect a strong ship, does not combine all the strength which, with the same weight of material, might have been obtained; and with respect to her model, it is my opinion that if she had less rise, and more floor, and so had drawn less water, she would have steamed faster, answered the helm quicker, and have proved in all respects more manageable and convenient. The Admiralty authorities, I know, do not agree in this view, and they are at the present moment spending a large amount of money in the national dockyards, for the express purpose of building a class of vessels similar in construction. In my opinion it

is, to say the least, very questionable policy for the Admiralty to speculate in this kind of shipbuilding. Private builders exerted themselves greatly in the production of armour-plated frigates for the Government; these vessels were produced in much less time than would have been consumed in the Naval dockyard, and in the matter of cost the difference must be greatly in favour of vessels built by contract. It is surprising to see the tenacity with which the Admiralty cling to wooden ships, notwithstanding the most overwhelming proofs that it is time to adopt iron exclusively.

It was my desire to furnish the Association with accurate statistical details of the iron shipbuilding trade of these northern rivers, showing the quantity of iron consumed, the number of men directly employed, and the amount of tonnage launched per annum. But unfortunately, my neighbours here, and on the Wear and Tees, with a few exceptions, were too much engaged to supply me with the statistics of their respective establishments; I have, therefore, estimated the several totals from such materials, aided by personal knowledge and experience, as I was able to obtain, and the following statement will, I think, be a pretty close approximation to accuracy:—

	Tons.
Estimated amount of tonnage of iron ships launched on the Tyne during the year 1862	32,175
Do. on the Wear	15,608
Do. on the Tees	9,660
	57,443

The number of men annually employed in producing this quantity of tonnage, exclusive of those engaged in the manufacture of engines was—

	Men.
On the Tyne	4,060
„ Wear	2,500
„ Tees	1,550
Total	8,110

The quantity of iron consumed during the same period, in the construction of iron ships, was—

	Tons.
On the Tyne	22,540
„ Wear	9,360
„ Tees	6,760
Total	38,660

The amount of iron tonnage at present on the stocks in this district is as follows:—

	Tons.
On the Tyne	33,000
„ Wear	19,000
„ Tees	10,600
Total	62,600

But these statistics show us only the labour that is directly employed in the production of iron ships, and that, as we all know, is but a small proportion of the whole. It would indeed be difficult accurately to estimate the amount of labour that is indirectly concerned in this trade, as, for instance, in the manufacture of iron, the production of coals, the importation of timber, the construction of engines, and the supply of anchors, chains, sails, &c., &c. Enough has been said, however, to prove that iron shipbuilding is one of the most important branches of industry in this great commercial and manufacturing district.

I may perhaps be allowed to describe very briefly the operations of my own firm, which, I trust, will prove of some interest, as showing the extent to which one establishment may be developed. In the first place, we obtain the greater portion of our iron stone from our own mines. At a point on the coast ten miles north of Whitby, the ironstone seams crop out in the sides of the cliffs, and here we have formed the small harbour of Port Mulgrave, where vessels can ride in safety, and ship their cargoes with ease and expedition. Between the Tyne and Port Mulgrave, some of our steamers run direct, making on the average four voyages per week, whilst others of a larger class call to load stone on their return voyage from London. At Jarrow, the ore is delivered to the furnaces by means of the Armstrong hydraulic cranes, and mixed with ores from Cumberland, Devonshire, and Lincolnshire, thence it is passed to the mills, and from the mills to the ship-yards. The number of men employed in these operations is upwards of 3,500. The number of tons of iron consumed per annum in our yards and engine-works is about 18,000 tons. The amount of tonnage launched during the year ending the 1st August was 22,000 tons. We have 15,000 tons in course of construction, and orders spread over a period for 40,000 tons more. Amongst these latter are steamers of upwards of 3,400 tons burthen, pronounced by their owners to be "the finest and most complete merchant steamers ever built." They are intended to bring cotton from the Southern States of America, so soon as the unhappy war in that country shall cease, and they will no doubt be but the pioneers of others of a similar class. One of these steamers is of sufficient capacity to carry 7,000 bales of cotton, and it is estimated that, during one year, she will bring from New Orleans to Liverpool 38,000 bales. The crew of such a vessel consists of sixty hands, and it would require five sailing vessels of 1,200 tons each, employing 130 seamen, to do the same work.

A consideration of the future of the iron shipbuilding trade opens out a vast field for speculation; but the ultimate result is not difficult to anticipate. We have seen with what success sailing vessels have been superseded by steamers in the coasting and coal trades, and we know that magnificent fleets of steamers, engaged in the postal and other services, are ploughing almost every known sea. As commerce increases, there will be few trades in which the employment of iron steamers will not be found of advantage. Most of the carrying trade to the Baltic and Mediterranean is already conducted in vessels of that class, and the sailing ships that cross the North Atlantic are being rapidly displaced by iron steamers. Their advantages in strength, speed, and capacity, are so marked, that sailing vessels of timber must give way before them. Even the Admiralty, cautious and unyielding though it be, will have to abandon its "wooden walls" in favour of the stronger and more useful material; a material, too, that lies in rich profusion beneath our feet, and has not, like timber, to be purchased of other nations. The commercial men of this country have set the Admiralty a signal example of industry and enterprise. It is they who have made the experiments and adopted the inventions that have established the maritime supremacy of this country; and it is owing to their energy that we find on every sea, in the shallow rivers of the east, and the deep broad waters of the west, English-built ships of commerce diffusing the benefits of free-trade, and linking nations and tribes together in the bonds of amity and peace. The truee source of our national greatness is to be sought in this wonderful development of our merchant navy. Other nations are entering into friendly rivalry with us, but the larger share of the carrying trade of the world will ever be secured to that country that can produce vessels combining the largest capacity with the utmost amount of economy and expedition in construction, and that can, at the same time, navigate those vessels with the greatst degree of skill and rapidity.

In conclusion, permit me to express the proud conviction I entertain that the mineral wealth of this district, and the skill and endurance of its workmen, whether on land or sea, will enable the locality that gave birth to an Armstrong and a Stephenson to maintain its character for maritime industry and enterprise, and to bear its full share in promoting the commercial greatness of the country.

On the Application of Machinery to Coal Cutting.

By Samuel Firth.

Numerous efforts have been made, during the last 50 years, to bring coal cutting in mines under the influence of mechanical power, but in no case, I believe, except at the West Ardsley Colliery, has any continuous operation survived the experimental period.

I do not expect that the introduction of machinery into coal mines for the purposes named, would materially diminish the number of persons employed, but rather that the effect would be to meet the increasing consumption. That increase may safely be taken at two millions of tons per annum, and to supply this increase would require an annual increase of labourers amounting to about 3,500. Thus there will not be any displacement of labour.

The steam engine has a 20-inch cylinder, and the air-pump 18 in. The air is worked at a pressure of about 50 lbs. to the square inch. The air is conducted down the shaft in iron pipes of 4 inches diameter, and thence to the workings (about 800 yards) in gas piping, and down the face by India-rubber piping of one inch diameter, which is connected to the machine. The machine is moved on iron rails laid on cross iron sleepers, and is propelled a little, after each blow of the pick, by the hand-wheel. Generally, the machine is passed three times over the face of the coal, each time with a longer pick, to gain the requisite depth for taking down. The first cut being 18 to 20 inches, the second 9 to 11 inches, and the third from 6 to 8 inches; 36 inches being the depth aimed at and accomplished. The actual quantity of work done in six consecutive days of eight hours each, by one man with one machine, was 618½ yards, or about 800 tons of coal. The man is attended by two boys, who clean out the groove, and remove the coal thrown out by the machine. In the West Ardsley seam a man will average 7½ yards of coal a day, so that if the machine were worked by shifts of eight hours, three men and six boys would do the work of forty men, and that, too, the most severe and trying work in the pit.

It must be understood that at West Ardsley the seam is somewhat favourable for the purpose. It is 4ft. thick, having a good roof and floor, and is worked on the long-wall system, with a somewhat soft bareing part, about 12in. above the floor, and in this the pick works. The comparison, however, with hand-work, is fairly made, because both work in the same part of the seam. The machine thus far has only been put to "bareing," or "kirving," but the proprietors expect to effect "straight-work" by a different arrangement of the picks. The filling, and all other work of the pit, is untouched by this machinery. The air-power works admirably; and its use gives a cool and refreshing stream of pure air to the far-distant works, which issues from the cylinder at a temperature very little above freezing point. It will not be necessary to say here that the air-power is acquired by a much larger measure of steam power; but this is not a material item at a colliery, where so much engine coal is almost worthless. I am not prepared with the exact commercial results or saving in cost, but at West Ardsley this part of the question is, I believe, eminently satisfactory. I have been informed that some experiments have been made, within the last few days, at the Hetton colliery, by the West Ardsley machine; and although the seam is of a hard nature, the kirving was done three feet deep with a groove of three inches at the face and two inches at the back, giving an average cut of 2½ inches high; whereas the average height of hand-kirving in the same seam is about 11 inches.

This saving of good coal from destruction is equal to an average of ninepence per ton upon the whole yield of the seam.

Another machine of a different principle has been invented at West Ardsley, and promises to be a most useful one. It is on the direct-action principle, with a to-and-fro motion, from a cylinder mounted transversely upon the carriage, and regulated in a similar manner to the pick machine.

This invention has not advanced so far as the "pick," but some recent experiments have given most satisfactory results. The complete success of this machine will be of great importance, as it will be more effective in "straight work," "headings," and "drilling," than the pick.

In conclusion, I may express the confident opinion that, at no distant period, every branch of mining will be accomplished by machinery; and if we look at those results from a humane point of view, the sooner they are realised the better it will be for all parties, and especially for the working collier.

EXAMINATION PAPERS, 1863.

(Continued from page 685.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May:—

FRENCH.

THREE HOURS ALLOWED.

Part I.

Candidates for a Third-class Certificate are to translate the following extract into English, and to answer the grammatical questions thereto annexed (in the order in which they are placed). The first part is all that is required of them.

Nous manquons essentiellement de la vertu civique avec laquelle les hommes des anciens jours rendaient service à la patrie au dernier rang. La maladie de notre temps est la Supériorité : il y a plus de saints que de niches. Voici pourquoi : avec la monarchie s'en est allé *l'honneur ;* avec la Religion de nos pères, *la vertu chrétienne ;* avec nos infructueux essais de gouvernement, *le patriotisme ;* du moins, ces principes-là n'existent plus que partiellement au lieu d'animer les masses ; car les idées ne périssent jamais. Maintenant nous n'avons plus pour étayer l'ordre social d'autre soutien que *l'égoïsme.* Les individus croient en eux ; l'avenir, c'est l'homme social ; nous ne voyons rien au-delà. Le grand homme qui nous sauvera du naufrage vers lequel nous courons, se servira sans doute de ce ressort pour nous refaire nation ; mais en attendant cette régénération, nous sommes dans le siècle des intérêts matériels et du positif. Ce dernier mot est celui de tout le monde. Nous sommes tous chiffrés, non d'après ce que nous valons, mais d'après ce que nous pesons. Aussi l'homme d'énergie obtient-il à peine un regard, s'il est en veste. Ce sentiment a passé dans le gouvernement. Le ministre envoie une médaille d'argent au marin qui sauve au péril de ses jours une douzaine d'hommes, et donne la croix d'honneur au député qui lui vend sa voix.—Balzac.

1. Parse the first two sentences of the above extract (down to "niches").

2. Give in distinct lines the five primitive tenses of each of the following verbs:—*S'en est allé, croient, voyons, courons, se servira, valons, obtient.*

3. Put the article and a suitable epithet before each of the following nouns, so as to show its gender:—*Faîte, parterre, rhume, brume, lierre, adage, parachûte, parafe, épices, cortége, trapèze, enclume, légume, cloison, laboratoire, poix, chaux, platine.*

4. Give the substantive which corresponds to each of these adjectives:—*Civique, ancien, saint, social, grand, matériel;* and also the adjective which corresponds to each of these nouns:—*Vertu, homme, supériorité, monarchie, religion, patriotisme, idée, égoïsme, intérêt, péril.*

5. Give the nouns and adjectives that correspond to *essentiellement* and *partiellement*, and state how a French adverb is formed.

6. Explain why, in the last sentence but two of the extract, the nominative case comes after the verb, viz.,

"obtient-il," as though the question were interrogative, which is not the case. Can you give other instances of a similar construction?

7. State the difference there is between *du moins* (7th line) and *au moins*.

8. What is the meaning and use of the particles *ci* and *là* in: "cet homme-ci," "ces principes-là?"

9. Explain the particle *ne* in every one of the following different sentences:—

"On se voit d'un autre œil qu'on *ne* voit son prochain." —La Fontaine.

"Car que faire en un gîte, à moins que l'on *ne* songe?" —La Fontaine.

"Gardez qu'une voyelle à courir trop hâtée,
Ne soit d'une voyelle en son chemin heurtée."
Boileau.

"Je tremble qu'Athalie * * * * *
N'achève enfin sur vous ses vengeances funestes,
Et d'un respect forcé *ne* dépouille les restes."
Racine.

"Depuis l'invention de la poudre, les batailles sont moins sanglantes qu'elles *ne* l'étaient."—Montesquieu.

10. Show with examples when *will*, *would*, *should*, *may*, and *might*, must be considered as mere auxiliaries of the verb which they precede, and when, on the contrary, they are separate verbs to be rendered separately by some tense of *vouloir*, *devoir*, or *pouvoir*, in French.

11. Give all the constructions and meanings of "que" in French.

12. When is it desirable to use *lequel*, *laquelle*, *lesquels*, &c.,, *duquel*, instead of *qui*, *que*, *dont*?

13. In the answers of a dialogue the French language is less elliptical than the English. Illustrate this rule by a few examples, such as—

Is it a letter you are reading?—Yes, *it is*.
Is that quotation from Bayle?—Yes, *it is*.
Do you understand French?—Yes, *I do*.
Are you going away?—No, *I am not*.

14. Conjugate the verbs *venir* and *s'émouvoir*, giving the first person singular and plural of all the tenses, including the compound ones, with the English.

Part II.

Candidates for a Second-class Certificate are to answer the next four grammatical questions, and to translate the English extract and the idiomatic expressions which follow:—

1.—Grammar.

1. Show to what extent the French syntax differs from the English in reference to *personal pronouns*. Illustrate your answer with examples.

2. Will you keep the pronoun in the same *case* in rendering these sentences in French:—Let *him* read—let *him* read his book; make *him* write—make *him* write his letter.

3. Correct the mistakes here:—*Quoique* vous fassiez, *quelques* soient vos talents, *quelques* honorables que vous soyez, vous aurez toujours des détracteurs.

4. How do you account for the difference in the spelling of these past participles:—

Je les ai *envoyé* chercher par la police.
Je les ai *envoyés* chercher la police.

2.—Translation.

The service, therefore, rendered by Voltaire in purging history of these foolish conceits, is, not that he was the first by whom they were attacked, but that he was the first to attack them with success; and this because he was also the first who mingled ridicule with argument, thus not only assailing the system, but also weakening the authority of those by whom the system was supported. His irony, his wit, his pungent and telling sarcasms, produced more effect than the gravest arguments could have done; and there can be no doubt that he was fully justified in using those great resources with which nature had endowed him, since by their aid he advanced the interest of truth, and relieved men from some of their inveterate prejudices.

It is not, however, to be supposed that ridicule was the only means employed by Voltaire in effecting this important object. So far from that, I can say with confidence, after a careful comparison of both writers, that the most decisive arguments advanced by Niebuhr against the early history of Rome had all been anticipated by Voltaire, in whose works they may be found by whoever will take the trouble of reading what this great man has written, instead of ignorantly railing against him.—H. T. Buckle.

3.—Idioms.

1. Advienne que pourra, je m'en lave les mains.
2. Vous n'y êtes point, je vous le donne en cent.
3. Il a voulu m'en donner à garder.
4. Il n'y va pas de main morte.
5. Vous avez l'air de revenir de Pontoise.
6. A bon chat bon rat.
7. On lui a tiré une plume de l'aile.
8. Il sait faire patte de velours.

Part III.

Candidates aiming at a First-class Certificate are expected to translate the above English extract and idiomatic expressions, and to answer, *in French*, the following questions:—

Literature.

1. What are the principal works of Molière, Pascal, Boileau, and Racine? Give an epitome of one of Molière's comedies or one of Racine's tragedies.

2. Sketch the life of either Madame de Sévigné or Bossuet.

3. Explain the healthy influence of Boileau and the other great writers, his contemporaries, on their age and country.

History.

State what you know of the administration of Colbert, and name some of the principal measures for which France was indebted to him.

GERMAN.

THREE HOURS ALLOWED.

Each candidate is expected to translate one of the following passages; to answer some of the grammatical questions, and turn into German several of the sentences and pieces given for this purpose. Candidates for a first class must translate one piece of Section I., (e) and (f) of Section II., and 23, 24, and 25 of Section III., and write the Essay.

Section I.

1. Ihrem Beispiel folgten auch die übrigen adeligen Herren, Grafen und Ritter. Jeder wollte so unabhängig wie möglich sein. Einen Herrn und Richter über sich zu haben konnte er schwer ertragen; und wenn er sich beschädigt oder beleidigt glaubte, so schaffte er sich lieber mit dem Schwerte Genugthuung, als dass er eine Klage bei dem ordentlichen Richter, oder dem Könige, als höchstem Richter, hätte erheben und den Urtheilspruch abwarten sollen. Diese Neigung mit der Faust sich Recht zu verschaffen, fängt seit Ludwig des Frommen Zeit, der mit seinen eigenen Söhnen das Beispiel gegeben hatte, schon an, und hat sechs Jahrhunderte hindurch in unserm Vaterlande mehr oder weniger geherrscht. Man nennt dieses die Zeit des Faustrechts, wovon weiter unten ausführlicher die Rede sein wird. Doch war es nicht immer gleich arg. Wenn ein kräftiger König regierte, der sich Ansehen zu verschaffen wusste, so ging es doch im Ganzen viel ruhiger und friedlicher zu.

2. Kein Wunder, dass ein so unnatürliches Gericht, das selbst dem duldsameren Geist der Spanier unerträglich gewesen war, einen Freistaat empörte. Aber den Schrecken, den es einflösste, vermehrte die Spanische Kriegsmacht, die auch nach wiederhergestelltem Frieden beibehalten wurde, und, der Reichsconstitution zuwider, die Gränzstädte anfüllte. Karl dem Fünften hatte man diese Einführung fremder Armeen vergeben, weil man ihre Nothwendigkeit einsah, und mehr auf seine guten Gesinnungen baute. Jetzt erblickte man in diesen Truppen nur die fürchterliche Zurüstung der Unterdrückung und die Werkzeuge einer verhassten Hierarchie. Eine ansehnliche Reiterei, von Eingeborenen errichtet, war zum Schutze des Landes hinreichend und machte diese Ausländer entbehrlich. Die Zügellosigkeit und Raubsucht dieser Spanier, die noch grosse Rückstände zu fordern hatten, und sich auf Unkosten des Bürgers bezahlt machten, vollendeten die Erbitterung des Volks and brachten den gemeinen Mann zur Verzweiflung.

3. Schnell fertig ist die Jugend mit dem Wort,
Das schwer sich handhabt, wie des Messers Schneide
Aus ihrem heissen Kopfe nimmt sie keck
Der Dinge Maass, die nur sich selber richten.
Gleich heisst ihr alles schändlich oder würdig,
Bös oder gut—und was die Einbildung
Fantastisch schleppt in diese dunkeln Namen,
Das bürdet sie den Sachen auf und Wesen.
Eng ist die Welt, das Gehirn *weit.*
Leicht bei einander wohnen die Gedanken;
Doch hart im Raume stossen sich die Sachen;
Wo eines Platz nimmt, muss das Andre rücken—
Wer nicht vertrieben sein will, muss vertreiben;
Da herrscht der Streit, und nur die Stärke siegt.
Ja, wer durchs Leben gehet ohne Wunsch,
Sich jeden Zweck versagen kann, der wohnt
Im leichten Feuer mit dem Salamander,
Und hält sich rein im reinen Element.

4. Ausführlich und umständlich, wie es der König liebt. Ich erzähle, wie zuerst zu St. Omer die bilderstürmerische Wuth sich zeigt. Wie eine rasende Menge mit Stäben, Beilen, Hämmern, Leitern und Stricken versehen, von wenigen Bewaffneten begleitet, erst Kapellen, Kirchen und Klöster anfallen, die Andächtigen verjagen, die verschlossenen Pforten aufbrechen, alles umkehren, die Altäre niederreissen, die Statuen der Heiligen zerschlagen, alle Gemälde verderben, alles, was sie nur Geweihtes, Geheiligtes antreffen, zerschmettern, zerreisssen, zertreten. Wie sich der Haufe unterwegs vermehrt, die Einwohner von Ypern ihnen die Thore eröffnen. Wie sie den Dom mit unglaublicher Schnelle verwüsten, die Bibliothek des Bischofs verbrennen. Wie eine grosse Menge Volks, von gleichem Unsinn ergriffen, sich über Menin, Comines, Verwich, Lille verbreitet, nirgend Widerstand findet, und wie fast durch ganz Flandern in einem Augenblick die ungeheure Verschwörung sich erklärt und ausgeführt ist.

SECTION II.—GRAMMAR AND IDIOMS.

(a) When do you use mein, dein, &c., in the Nom. Masc. and Neuter, and when meiner, meines, deiner, deines, &c.?

(b) When must the personal pronouns he, she, it, they, be translated by derjenige, &c.?

(c) What is the difference between the relative pronouns wer and welcher?

(d) When must the verb be placed at the end of a sentence?

(e) How do you treat a relative clause of which you omit the relative pronoun and the auxiliary verb, such as "the people, assembled in great numbers, hailed the Princess with enthusiasm?"

(f) Er macht sich nichts aus ihm (daraus).
Nehmen Sie sich in acht.
Es liegt mir nichts daran.
Es lag nicht an mir.
Ich will es darauf ankommen lassen.
Jetzt war guter Rath theuer.
Die er für seine wärmsten Freunde hielt, brachten ihn um seinen guten Ruf.
Solches Wetter bringt mich um.
Auf welche Weise kam er um?
Nun galt es die Augen offen halten.
Was gilt's, er lässt sich nichts merken?
Wenn es auf mich ankäme, so sollte ihm die Sache nicht schwer fallen.
Er behauptet, es gälte nichts weniger als das Leben.
Ich werde mich schon zurecht finden, wenn ich nur einmal weiss, wo ich dran bin.

SECTION III.

Translate into German ten of the following passages either in English or German character, but very legible.

1. It has left off raining.
2. The clouds are dispersing.
3. The sky is clear.
4. The weather is getting fine.
5. Let us take a walk.
6. Where shall we go to?
7. Let us go into the park.
8. The gravel there soon dries.
9. How did you spend last evening?
10. I was in a very pleasant company, where they played and sang.
11. Did they play music or at cards?
12. I am no card-player, and never go to a place where I know card-playing is going on, and never stay when they unexpectedly begin to play.
13. No, several ladies played on the piano, some played solos, others duets; and they all played well, and good pieces.
14. You must get your coat mended.
15. He has had his house painted from top to bottom.
16. Make the boy learn his lesson.
17. They caused him to be sent out of the country.
18. I have not been able to answer him as I could have wished.
19. Would you have engaged in such an undertaking if it had been in your power?
20. I have heard it said by several people that he was helped in this essay by more than one person.
21. His wounds were cured through the skill of Mr. N— in an incredibly short time.
22. He was met in his journey by a friend whom he believed to be then travelling in South America.
23. Not having received the information I expected, I refused to enter into any engagement.
24. He relies on your informing him as soon as you have made up your mind to enter upon the proposed emigration.
25. Life has been compared to a river. If ours is not such, it is because its springs are not on the mountain, but in marshes and the lowlands. The peace promised to the good man shall not be like a shower falling with temporary abundance, but like the river which flows by the cottage door, always full and always singing. The man hears it when he rises in the morning; he hears it in quiet noon; he hears it when the sun goes down; and, if he wakes in the night, its sound is in his ear. It was there when he was a child; it was there when he grew up to manhood; it is there now that he is old and decrepit; and it will murmur by his grave upon its banks; nay, it will flow and sing for his children after him.

Write, in German, a short and concise essay: ON THE UTILITY OF THE STUDY OF LANGUAGES, AS A DISCIPLINE TO THE MIND.

(To be continued.)

Home Correspondence.

THE GROWTH OF COTTON.

SIR,—I am indebted for the following paper to his Excellency Sir Charles Darling, now governor of Victoria, who has taken a great interest in our cotton movement, and has himself an extensive cotton plantation in Jamaica, adjoining the estates of our company.

I am, Sir, yours faithfully,

STEPHEN BOURNE.

Jamaica Cotton Company (Limited),
55, Charing-cross, London, S.W., Sept. 3.

THE "GOSSYPIUM ARBOREUM," OR TREE-COTTON.

Mr. R. C. Kendal, of the United States, not long since delivered a lecture to his countrymen, in which he stated that he had successfully cultivated this cotton in northern parts of America, and he details the manner in which he became acquainted with it as follows:—

"Several years ago, while an *employé* in the Patent Office, I received and accepted a tempting offer from a Chilian gentleman of wealth, Senor Alrogara, to conduct certain matters on his estate. One holiday morning, not very long after my arrival at my temporary South American home, I set out on horseback along the course of a modest little river called the Chipura, and forming the boundary between semi-civilisation and the territory of the Ypurian savages. Resolved to explore as much of my patron's domains as the brief May day would allow, I pushed briskly forward over the already frozen ground, covered fetlock deep with newly-fallen snow, following the windings of the stream, whose sedgy banks of dark rock, generally thrust back, as it were, by alluvial bottoms from one to three hundred yards distant, indicated that the Chipura had one day been a river of ten times its present volume. After a ride of some two hours, in doubling an abrupt turn where the rocks approached very near the water, I came suddenly into a full view of an object some 200 yards distant, which presented the most magnificent spectacle I had ever seen: a perfect cone, a pyramid of pure brilliant snow, elevated at its base, perhaps seven feet from the ground, upon a shaft of whitish bronze, the whole structure cut clean and sharp against the dark wall of rock in the back ground.

"I had in northern countries, after a calm fall of snow, seen many a white pyramid having an internal structure of pine or spruce; but knowing that, in the present instance, the snow had fallen during a violent gale, and observing that none of the pines about me bore any traces of it upon their branches, I rode forward in some bewilderment to investigate the phenomenon. It resolved itself, as I drew near, into a most perfect specimen of *Gossypium arboreum*, the perennial cotton tree. Its foliage had long been shed, but the pods remained, having fully burst, and turned out their spotless samples in almost perfect roses, covering the entire structure with a dense mass of spotless glossy cotton. I had often seen and examined indifferent specimens of the perennial cotton shrub; but I had never seen anything even approaching in perfection that solitary tree. The remainder of that, and many a saint day thereafter, was devoted to intimate companionship with, and diligent study of the habits, peculiarities, and general economy of the beautiful solitaire of the Chipura. Having no facilities for gathering and weighing the yield of that individual tree, my estimate was, of course, only an approximate conjecture; but I would not be willing to fall below 100 lb. as the amount of clean 'lint' afforded by the cone, having a diameter of 12 feet at the base, and measuring a trifle over 18 feet from base to apex.

"Were I to take this solitary wonder as a fair sample of perennial cotton generally, I should be doing gross injustice to the public, to the tree, and no very special credit to myself; for in more than a year's intimate acquaintance with the arboreum family I have found its individual members, under various circumstances, differing from each other as widely as do the various degrees of humanity, from the monarch to the mendicant.

"I shall endeavour, in my brief description of the tree, to follow the true medium between the two extremes. In its native condition, and in the higher southern latitudes, the average size of the *Gossypium arboreum* equals the medium peach-tree of North America—say, eight inches in diameter at two feet from the ground, and in height twenty feet, in its general structure more nearly resembling the white mulberry tree than any other tree with which I am familiar. The leaves are abundant, distinctly denticulated and of a glossy silvery green, flowers profuse, very double, variegated, and in size about a third smaller than the perfected hollyhock; the tree, when in full bloom, presenting one of the most beautiful effects imaginable. The balls at maturity are twice the size of those borne by the herbaceous plant; and wherever it approached the colder regions, I found its fibre finer and the length of staple increased.

"The perennial cotton-tree is propagated from seed, or more readily from cuttings simply thrust into the ground, and possesses this peculiar advantage in any country over the herbaceous plant. It may be planted out as an apple, pear, or peach orchard, and the field cropped with any of the cereals, until the tree, having reached its maximum standard, should entirely occupy the land. It bears cutting as kindly as any known tree, and in field culture may always be kept so pruned that its produce shall be within reach of the hand. From my own observations, and all the information I have been able to obtain, the perennial cotton is never liable to the vicissitudes of weather or destruction by the numerous insects so inimical to the herbaceous plant. That the *Gossypium arboreum* is to be introduced in our immediate vicinity, and its merits as a cotton bearer amongst us fully tested, is almost beyond a question; for there is present a gentleman of long practical experience in agriculture, and a thorough-going farmer, possessed of ample means, and a fixed determination to take the initiative in an enterprise which, once consummated, will do more towards humanising and Christianising mankind; more towards binding our whole country in the strong bonds of eternal union; more towards banishing discord for ever from among us than all the legislating diplomacy and war that ever distracted civilisation. The period is not very remote when hedges most efficient as fences shall yield annual dividends of superior cotton; ornamental cotton-trees, blending the useful with the beautiful, shall repay tenfold their cost and culture; when the rugged heights of the Hudson, the plains of New Jersey, the fertile valleys of the Keystone state and the undulating prairies of the great West, shall gleam in the sunlight, white as the winter drift, with generous pods of democratic cotton. Having thus communicated the conclusions arrived at after a year's diligent study of the growth, habits, produce and general economy of the perennial tree-cotton, and also detailed the result of my own patient experiments in a latitude where the climate is as vigorous as it is in New York, permit me to introduce testimony towards establishing the fact that cotton can be produced abundantly and profitably in three-fourths of the free states. In the first instance, the cotton-tree of South America does grow both spontaneously and under culture, producing a fine and long glossy staple in high southern latitudes, where snow covers the ground three months of the twelve, seems to be evidence conclusive that it will flourish equally well in latitudes north of the equator corresponding to those of the southern hemisphere, in which it abounds and defies the rigour of a climate that nothing less hardy than a North American apple-tree could withstand.

"As none of the gossypium family, with the single exception of the giant specimen of Borneo, are strictly tropical in their origin, habits, and organisation, there can be no philosophical or practical argument brought forward to prove that even the herbaceous plant, when by skilful treatment and judicious culture it has been changed

into a hard-wooded shrub, may not be grown successfully in any northern region, having a soil suitable to its development, where four months out of the twelve are free from frost. In answer to the almost universal argument in the North—that the season of the free states is not long enough to mature the cotton crop, I would simply say it was a mistake.

"On the 7th of October, 1850, I left Boston for the South. Up to that date there had not been a frost in Massachusetts sufficiently severe to nip the most delicate plants. On the morning of the 15th of the same month, in passing along the streets of New Orleans, I observed ice in the gutters the thickness of ordinary window glass, and, upon inquiry, learned that the place had been visited with frost regularly for ten consecutive nights. That certainly was a somewhat unusual occurrence, but my own observation for many years has been, that beyond the influence of the breeze from the great Mexican Gulf, 'Jack Frost' is quite as early a visitor in the Southern States as he is in Massachusetts. It is true he takes his departure somewhat earlier in the spring, but he returns most inconsistently at times even in Florida.

"Less than twenty years ago it was currently believed and positively asserted by pomological *savans*, that the United States could never become a wine-producing country, because no grape of foreign origin would ripen in its climate. Dr. Underhill, of Croton Point; Nicholas Longworth, of Cincinnati; and a whole army of successful vine growers and wine makers all over the country, have long since proved the fallacy of such reasoning."

Proceedings of Institutions.

Ipswich Mechanics' Institution.—The thirty-eighth annual report states that the committee have not yet succeeded in clearing the current account of the liabilities which have pressed upon it for the last few years, the amount of unpaid bills being about the same as at the last annual meeting. Nothing, however, can be more satisfactory than the financial position of the Institution; and there is one item in the accounts to which your committee can point with great satisfaction, and that is the sum received in subscription from members, which is the largest ever yet received in one year under that head. This, of course, indicates a larger number of members upon the books, another satisfactory index of the position of the Institution. The number reported at the last general meeting was larger than is usual in the summer months, and the number now reported, 665, is larger than has ever been reported. The committee promised at the last general meeting to present at this meeting a detailed financial statement of the funds expended upon the recent improvements in the lecture-hall. The fact that the architect has not yet made his final survey of the works prevent their keeping this promise, as the allowances for abatements on the original contract, and the charges for extras, cannot be known till after that survey is made. It may, however, be briefly stated that £355 has altogether been paid to the contractor, and that a small balance still remains on hand out of the sum raised for the building fund. The committee were empowered at the last annual meeting to raise £150 on loan, but they have not at present raised more than £100, which they have done at four per cent. interest. With regard to the improvements themselves, they have proved most successful, and the committee have reason to hope that the improved value of the hall, as a commercial speculation, will be equally apparent in the next balance sheet. The committee of the educational branch found it advisable this year to wind up its affairs. The educational branch had been going on for several years with a gradually decreasing number of pupils and an increasing debt. The committee are glad to see that an effort is being made in the town to perform the work which was undertaken by the educational branch, by means of another and perhaps an improved organisation, and, wishing the young Institution every success, they have embraced every opportunity of rendering it assistance. Various books have been added to the library during the year. The committee feel that the present opportunity ought not to be lost for thanking the numerous friends of the Institution who, in the most handsome and liberal manner, have come forward and subscribed over £200 towards a fund for effecting the long needed alterations in the lecture hall, the result being that the Institution has now one of the best lecture-rooms in the eastern counties. The committee cannot but feel that, valuable as is the assistance thus rendered to the Institution in a pecuniary sense, it is still more to be prized as a token of its popularity and a proof that the course which it has pursued of late years is generally approved of. In addition to substantial marks of good-will and assistance already received, your committee have received a letter from Mr. Hunt, offering to make "one with nine others (if such can be found) in presenting £5 a piece, making £50, for the purchase of books for the use of members of the Institute." Since the last annual meeting the Institution has lost a good friend in the person of the late Mr. J. B. Alexander, who had been for many years a Vice-President of the Institution. Since the last annual meeting your secretary has resigned the office of collector, and the librarian has been appointed collector in his place. On the whole the committee feel that there is stronger ground for congratulation at the prosperity of the Institution than ever. It has now the largest number of members on the books, and consequently the largest amount of subscriptions ever recorded. It has a handsome lecture-hall in good repair, and in connection with this building, it should be borne in mind that one cause of the temporary embarrassment in the current funds is the fact that the Institution is regularly investing £2 monthly towards paying off the debt which was contracted when the hall was built. In this manner the original debt of £1,300 has been reduced to about £850, and as soon as it falls to £800, which at the present rate of investment will take place in about two years, there will remain no further necessity for cramping the current income of the Institution by any charges for the liquidation of capital debt, and this will be equal altogether to an increase of £35 annual income. The receipts have been £475, and the outstanding liabilities are £78.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August* 28*th*, 1863.]

Dated 18*th August*, 1863.

2046. J. Briggs, Blakely, Lancashire—Certain imp. in coating or covering crinoline steel.
2048. H. Robinson, Skipton, Yorkshire—Imp. in lime-kilns.
2052. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of hats, caps, and bonnets, and in apparatus employed therein. (A com.)
2054. J. B. V. Faure, Aschaffenburg, Bavaria—Imp. in pen and ink holders.

Dated 19*th August*, 1863.

2058. C. Sonnhammer, Regent-street—An improved fan.
2060. T. Scott, Nelson-square—Imp. in the construction of floating docks or apparatus for lifting ships and other bodies.
2062. S. Sanderson, High-street, Shoreditch—An improved fastening for leggings, stays, or other articles.
2064. R. H. Jackson, Olive Branch Works, Meadow-lane, Leeds—Imp. in machinery for sawing wood and other fibrous substances.

[*From Gazette, September* 4*th*, 1863.]

Dated 20*th June*, 1863.

1549. G. Brixey, Maida-hill, Middlesex—Imp. in apparatus and implements for cleaning spoons and forks.

Dated 27*th June*, 1863.

1614. T. Dunn, Windsor-bridge Iron Works, near Manchester—Imp. in the construction and maintenance of the permanent way of railways.

Dated 27*th July*, 1863.

1865. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in coal oil lamps. (A com.)

Dated 28th July, 1863.

1872. Baron A. A. A. De Rostaing, 29, Boulevard St. Martin, Paris —An improved method of manufacturing iron and steel with cast iron taken in the subdivided state.

Dated 1st August, 1863.

1909. E. Sutton, Palace-road, Well-street South, Hackney—Imp. in fastenings for cigar cases, porte-monnaies, bags, and other like articles.

Dated 10th August, 1863.

1971. R. J. Cunnack, Helston, Cornwall—Imp. in the manufacture of cartridges for blasting and projectile purposes.

Dated 11th August, 1863.

1975. E. Myers, 2, Millbank-row, and Hugh Forbes, 6, Aberdeen-place, Maida-hill—An improved rotary pump.

Dated 13th August, 1863.

1997. J. Ellis, Liverpool—Imp. in machinery for scouring, cleaning, and polishing wheat, rice, malt, grain, and other seeds.
1999. E. Winchcomb, 3, China-walk, Lambeth—Imp. in street pillar letter-boxes and bags for the reception of post letters.
2001. T. Ashwin, Birmingham—A new or improved dress fastening, which said fastening may also be applied to the fastening of braces, belts, and other bands, and to other like purposes.
2003. J. Henderson, Bradford, Yorkshire—Imp. in preparing yarns for printing.

Dated 14th August, 1863.

2008. C. Schiele, Clarence-buildings, Manchester—Imp. in fans, pumps, and machinery for propelling air, fluids, or other substances by centrifugal force.
2011. E. Taylor, Salford, Lancashire—Certain imp. in machinery or apparatus for churning.
2013. F. J. Jones, Aldermanbury—Imp. in locks or fastenings.
2014. M. H. Lishman, Stockton-on-Tees—Imp. in machinery for punching and for marking plates in which holes are to be punched.
2015. M. Siegrist, Ewell, Surrey—Imp. in railway breaks actuated by the pressure of the atmosphere.
2017. J. Wain, Manchester—Imp. in machinery or apparatus for doubling or twisting yarns or threads of cotton and other fibrous materials.

Dated 15th August, 1863.

2019. J. W. Hoffman, Rydon-street—Imp. in apparatus for producing optical illusions for stage effect in theatres or exhibitions.
2021. G. Yates, Oswaldtwistle, Lancashire—An improved means or method of indicating the number of tubs or other measures or quantities of coal or other substance or material drawn from pits or mines.
2025. R. Smith, Manchester, and J. Booth, Gorton, near Manchester —Imp. in the manufacture of paper hangings.
2027. F. Flavell, Welton, Northamptonshire—Imp. in shakers for thrashing machines.
2029. T. Brooks, Wyld's rents, Long-lane, Bermondsey—Imp. in means or apparatus for the production of charcoal and other products from refuse tan and other woody substances.
2031. A. V. Newton, 66, Chancery-lane—Improved apparatus for printing. (A com.)
2033. E. H. Bentall, Heybridge, Essex—Improved machinery for thrashing corn and other grain or seeds.
2035. A. W. Parker, Bristol—Imp. in the manufacture of soap.

Dated 17th August, 1863.

2037. A. M. Dearn, Colchester—A new centrifugal disc mashing machine.
2039. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in the processes and preparations employed in spinning wool. (A com.)
2042. T. Loftus, Preston—Imp. in apparatus for attaching to steam boilers and flues for the consumption of smoke.
2043. J. S. Crosland, Ashton-under-Lyne—Imp. in lubricating, and in arrangements and mechanism for lubricating the bearings, journals, or steps of spindles, shafts, axles, and other mechanism.

Dated 18th August, 1863.

2045. J. Arthur, M.D., 1, Robert-terrace, Chelsea—An improved apparatus for the prevention, cure, and relief of hernia of every description, together with prolapsus uteri, uterine hemorrhage, hernia humoralis, and as a general support for enlargement of the abdomen from whatever cause proceeding.
2047. J. Brennand, Burnley—An improved construction of fire bars and apparatus connected therewith.
2049. T. Dobb, Rotherham, Yorkshire—Imps. in chimney tops, which imps. are also applicable to coverings for ventilating shafts or flues for mines and other places.
2050. A. Cruickshank, Glen-park, Lanarkshire, N.B.—Imp. in the manufacture or production of food for cattle and all other domestic animals, poultry, game, and in the machinery or apparatus employed therein.
2051. J. Yates, Rotherham, Yorkshire—Imp. in the manufacture and fitting or securing of armour plates, blocks, or bars, and in the machinery or apparatus employed therein, parts of which imp. are applicable to heavy forgings generally.
2053. R. A. Brooman, 166, Fleet-street—An improved method of and apparatus for treating molasses, syrups, saccharine juices, and other products. (A com.)
2055. C. H. McCormick, Chicago, U.S.—Imp. in reaping machines.

Dated 19th August, 1863.

2057. W. Jackson, 4, Spring-terrace, York-road, Lambeth—Improved arrangement of the parts in sewing machines using shoemaker's wax thread suitable for heavy boot or other leather work to which it may be applied.
2059. T. Howard, Hyde, Cheshire — Certain imp. in machinery for spinning cotton, flax, wool, silk, and other fibrous substances.
2061. G. T. Bousfield, Loughborough-park, Brixton—Imp. in apparatus for feeding weft in hair cloth looms. (A com.)
2063. G. Bonelli, Turin, and H. Cook, Gloucester-square—An improved mode of and apparatus for producing by the aid of photography optical illusions of moving animals and bodies.

Dated 20th August, 1863.

2066. W. Galloway and J. Galloway, Manchester—Imp. in steam boilers, and in steam and water guages for the same.
2067. S. Hallsworth, Elland, near Halifax, Yorkshire, and T. Platt, Fairfield, near Manchester—Imp. in the manufacture of certain colouring matters known as Prussian blue, Berlin blue, Paris blue, China blue, and Turnbull's blue.
2069. J. Fleming, Newlandsfields, Renfrew, N.B.—Imp. in preserving the colours of dyed fabrics.
2070. J. Platt and W. Richardson, Oldham, Lancashire—Imp. in machinery or apparatus for cleaning cotton and wool from seeds, burrs, and other extraneous matters.
2071. J. Platt and W. Richardson, Oldham—Imp. in machinery or apparatus for winding narrow laps of wool.
2072. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of cartridges. (A com.)
2073. C. D. Hammond, M.D., Charlotte-street, Bedford-square—Imp. in apparatus for the treatment of certain bodily ailments.

Dated 21st August, 1863.

2074. J. F. Hill, 23, Little St. Andrew-street, Upper St. Martin's-lane—An improved ventilating gas lamp or gaselier.
2075. J. Eccleston, Manchester—Imp. in apparatus for economising or regulating water power used for blowing organs or harmoniums, which improvements are also applicable for other purposes where an irregular motive power is desired.
2078. R. A. Brooman, 166, Fleet-street—Imp. in expressing and filtering oil from seeds, and liquids from other substances containing the same, and in apparatus employed therein. (A com.)
2079. W. Evans, Belgrave-street, Commercial-road-east—An improved artificial fuel.
2080. R. Griffiths, Mornington-road, Regent's-park—Imp. in the construction of retorts or ovens for extracting oil from certain descriptions of cannel coal or other bituminous substances.
2081. E. Pope, Clonmel, Ireland—Imp. in breech-loading fire-arms.

Dated 22nd August, 1863.

2083. T. Pegram, 22, Cardington-street, St. Pancras—A plate holder for the photographic camera, adapted to carry different sized plates, each plate being on the same plane and in the same focus.
2084. R. A. Brooman, 166, Fleet-street—Imp. in closing powder canisters and other vessels. (A com.)
2085. A. Watson, King-street—An improved method of and apparatus for inserting pictures in and withdrawing them from photographic albums.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2102. J. W. Friend, Freemantle, Southampton—Imp. in the construction of gas meters, and in apparatus to be employed in connection therewith for regulating the pressure and flow of gas to the same.—26th August, 1863.

PATENTS SEALED.

[*From Gazette, September 4th*, 1863.]

September 2nd.	677. W. Clark.
649. J. Isherwood.	681. J. Harris, J. Butler, and J. H. Fraser.
653. P. Hugon.	732. A. Morel.
655. W. J. Clapp and N. Coats.	761. W. Clark.
660. R. T. Monteith and R. Monteith.	788. R. Mushet.
670. J. Werge.	1602. R. Mushet.
671. J. Tomlinson.	1648. E. Lloyd.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, September 8th*, 1863.]

31st August.	2166. J. Hamilton, jun.
2114. W. Holroyd and S. Smith.	2186. W. Wilkinson and H. T. Wright.
4th September.	*5th September.*
2133. G. P. Wheeler.	2212. J. Chesterton.
2134. G. P. Wheeler.	
2153. R. Wright.	

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, September 8th*, 1863.]

2nd September.	*4th September.*
2062. B. O'N. Stratford.	2093. F. M. Herring.
3rd September.	*5th September.*
2070. R. Wilson.	2089. J. Fowler, jun.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 18, 1863.

NOTICE TO INSTITUTIONS.

The Programme of the Examinations for 1864 is now ready, and may be had *gratis*, on application to the Secretary of the Society of Arts.

The Papers set at the Final Examinations held in May last are also published, and may be had of the Society's publishers, Messrs. Bell and Daldy, Fleet-street, price sixpence.

ON THE FERMENTATION OF LIQUIDS AND THE IMPROVEMENT OF WINE MAKING.

By Dr. Edward Merton.

Lavoisier and other eminent chemists have directed their attention to the chemical changes produced by fermentation, but without any important practical result. The experiments that I have made have indeed proved to me, as far as the present evidence goes, that the changes are infinite in their nature and in their results.

In my opinion the subject should be examined by considering the relation of the oxygen to the fermentable liquid. The vapour of sulphur for instance has so strong an affinity for oxygen, that it will entirely remove it from a fermentable liquid, such as the must of the grape, and thus prevent the fermentation of the must. Nature in several wines produces something analogous to the action of the vapour of sulphur, and it is this which causes them to keep. However, I have succeeded in regulating the fermentation at pleasure, even to the stopping it completely, and then continuing its action without employing the vapour of sulphur, and this in three separate instances. By my process I have made from a wine of inferior quality an excellent and very alcoholic wine.

In fermentation there are at work two directly opposite forces, the one which causes, the other which moderates or arrests it. If the first is predominant, it causes the formation of lactic acid; if, on the contrary, it is the second force which is in excess, there is neither acid nor alcohol, and you have a liquid which resembles sherbet. In the juice of the grape you have for the first agent sugar, &c., and for the second agent bitartrate of potassa, an anti-ferment of the greatest utility, because it is one of the most soluble, and is precipitated in proportion as the alcohol is produced. It is in consequence of this property that in bottles which have contained port and other wines for some time, there is found spread over the glass a crust composed of bitartrate of potassa mixed with the colouring matter of the wine.

In years when the grape does not attain to a state of complete maturity there is an excess of bitartrate of potassa, and the wine keeps well; but in years which are favourable to the ripening of the grape, the first agent is in excess, and the wine does not keep so long. In this case it will be desirable to add to the must a certain quantity of bitartrate of potassa. In boiling the malt to make beer, as it contains no agent of the second kind to restrain the fermentation, the decoction would rapidly become acid if hops were not employed as the second agent to counteract the first. The cider manufactured in Normandy, and in England in the neighbourhood of Exeter, is wanting in the first agent, and consequently resembles sherbet. When I was in Devonshire, the idea occurred to me that the alcohol in a fermentable liquid perhaps depended on the quantity of sugar combined with the must. To ascertain whether this was the case, I took a measure of 40 litres (about 8 gallons) of cider-must as sweet as syrup, and I added a kilogramme and a-half (about 3 lbs.) of sugar; some days after, on examining this mixture, I found it tasted very like vinegar. Those to whom I mentioned the result told me that I had taken the precise means used at that place for making the strongest vinegar.

Here is, probably, the explanation of the phenomenon; the addition of the sugar had made the first agent predominate, had rendered the second powerless, and had transformed, by fermentation, the cider into strong vinegar. In fact, to give a summary of the process, just as to quicken a fire we blow it, to extinguish it we deprive it of air. So in fermentation, if you wish to increase it, make use of agents capable of inducing the union of oxygen with the fermentable liquid; if, on the contrary, you wish to modify it, make use of agents which have a greater affinity for oxygen than the fermentable liquid. As in the action already mentioned of the vapour of sulphur, I call the first agent a ferment or leaven; these may also be designated by the names of oxygenising agents.

There are certain phenomena which do not admit of explanation, and in expressing these we simply express a fact; thus, when I speak of oxygenation, or of deoxygenation, I mean to say that a certain effect is produced. This is an indisputable fact, but how it happens I cannot say. A piece of zinc attached to a piece of copper, prevents the oxygenation of the latter. This is a fact which may be explained by the action of electricity, but to explain how it happens that electricity produces this effect would be very difficult. Sometimes we can unravel, to a certain point, the phenomena of nature, and there we must stop.

It is greatly to be desired that a list should be made of all the agents which can produce, retard, or stop fermentation, but at present I am not able to do this. I will quote one instance of this necessity:—I have experimented in the same way on two different beers; one beer was excellent and unexceptionable, the other was flat and weak; and during the two years that I kept it under the most favourable circumstances for exciting fermentation, it did not show the least sign of working; the two beers were manufactured with different materials—the one with glucose without animal matter, the other with gelatine without glucose. Some few substances may be mentioned as having an oxygenising and others a deoxygenising property, but they require judgment and discretion in their use. Animal matters for the most part restrain fermentation; also carbonic, lactic, and even sulphuric and citric acids, in proportions which can be neutralised at pleasure, will produce the same effect.

It is generally, though not always the case, that substances which act on colours either to bleach them or to make them lighter, also arrest and diminish fermentation. The subject is not without difficulty, because it is not easy to prove that a heterogeneous liquid contains in itself different agents. These facts, in the present state of scientific knowledge, can only be proved by observation. If we find that by a certain action, a fermentable liquid becomes acid, and that by a contrary action it does not experience this change, we have the right to say that there are two forces which act in an opposite manner, and it is only by thus making careful observations that we can hope to improve the manufacture of wines. There has been much thought and labour expended to obtain this end, by means of analysis and synthesis, but the least investigation proves beyond a doubt that these means are entirely useless.

Nature, as has been shown, has furnished us with several instances where the sugar and the acid have not been decomposed, and where mixing with the "bouquet" and the alcohol they make a most delicious wine, for instance, Frontignac; and if analysis and synthesis can tell us how it happens that in this wine the fermentation is arrested at such a point as to give it the above-named qualities, we shall be in a position to manufacture Frontignac, and this argument also applies to other celebrated wines, such as Chateau Lafitte, Margaux, La Rose, Burgundy, Champagne, &c. But as yet analysis and synthesis have not arrived at this result. In the meantime I have attempted to fill up the gap, by the introduction into the manufacture of wine, of ferments and anti-ferments; it would, perhaps, be lost time to enumerate all the circumstances which may provoke or restrain fermentation. I have already referred to some, and I will only mention, to avoid being misunderstood, that in spite of having said that sugar is not the only necessary agent for making an alcoholic drink, it is one of the greatest importance, and plays an important part. At the present time I cannot do better than indicate the system which ought to be followed, in endeavouring to improve the making of wine, in which, I believe, much yet remains to be done.

NEW SOURCES OF COTTON SUPPLY.

The Committee of the Cotton Supply Association, in their last report, state that, from official returns, they find that during the past year cotton was received from the following places, which sent no supplies in 1861, viz.:—Canary Islands, Ionian Islands, River Gambia, China, Hong-Kong, Victoria (Australia), Japan, Tortola, St. Lucia, Cuba, Mexico, Central America (ports on Pacific), Chili. Some of these sources have doubtless been opened by the operation of high prices, and others by the efforts of your Association. The large supplies of cotton which the American war has suspended can only be gradually obtained elsewhere after years of exertion. But in proportion as the Association, by maintaining the communications which it has established with all cotton-growing countries—by the spread of the information which it can furnish—by the supply of seed, and by the local agencies which it calls into existence to co-operate with it, shall be able to multiply the sources from which cotton can be procured, and to increase their productiveness, it will continue to abridge the present severe crisis, and to prevent its recurrence.

The Committee have given much time and attention to the consideration of the best machines for cleaning cotton. The saw-gin, so generally employed on the shorter American staples, is extremely prejudicial to the long stapled cotton grown in other countries—instances of injury have been brought before the Committee causing a depreciation of from 20 to 30 per cent. in value. There is still great room for improvement in the construction of cleaning apparatus, and the Committee would specially direct the attention of machinists to the necessity existing for a gin of universal application, which shall turn out as much cotton as the saw, with that freedom from injury which is secured by the roller gin. The question of packing presses is engaging the attention of the best makers of the country, and the Committee desire especially to point out to the makers of agricultural implements the great demand for those of the best construction which has arisen in all cotton-growing countries. The Association obtained from the United States a complete set of the most approved agricultural implements, which, as models, are at the service of all makers who may choose to avail themselves of them. The Agricultural Exhibitions in Calcutta and Smyrna, in January, 1864, will be occasions of which makers would do well to take advantage.

BRITISH ASSOCIATION, NEWCASTLE-ON-TYNE, 1863.

Chemical Manufactures on the Tyne.

Mr. J. C. Stevenson read the following paper on "Chemical Manufactures on the Tyne:"—

Salt.—Salt works were formerly very numerous in this district, establishments having been formed at Howdon Pans, Hartley Pans, Jarrow, North and South Shields, and other localities. This trade was carried on by several of the most wealthy families in the neighbourhood in the beginning of the last century, and about 200 pans were employed in producing salt, which was extracted from sea-water and brine springs. Shields salt was the most celebrated salt in the kingdom, and was produced in such quantities at South Shields as to give a character and even a nomenclature to this town, which to this day is divided into East Pan and West Pan Wards. The remains of a large hill are still to be seen, formed from the ash of the salt pans. After a time these ashes took fire, and Mr. R. W. Swinburne—to whom we are indebted for this information—states that the Chapter of Durham are in possession of a picture, representing the burning hills at South Shields. The production of salt from sea water in this locality has given place to that obtained from the brine springs and rock salt of Cheshire, and illustrates what great changes take place in altering the *locales* of manufactures. A considerable quantity of white salt is still made on the Tyne from sea water, in which rock salt from Cheshire and Ireland is dissolved, in order to diminish the cost of evaporation. Two improvements have been successfully introduced in making white salt, which have the saving of fuel as their object. Mr. Wilkinson employs the waste heat of coke ovens for this purpose; and Mr. Fryar dries whitening with the heat which escapes from his salt pans.

Alkali (for this and the last century).—Two gentlemen, Mr. W. Losh and Mr. Thomas Doubleday, were engaged, unknown to each other, with a series of experiments on the best plan of converting common salt into carbonate of soda. Each of these chemists appear to have used very similar processes; and when the late Lord Dundonald came to reside in the neighbourhood, he was soon on intimate terms with both parties. Both Mr. Losh and Mr. Doubleday tried numerous plans at his lordship's suggestion; but after spending upwards of £1,000, Mr. Doubleday would seem to have tired of making an outlay which promised little or no result. The first plan tried was to effect the decomposition of common salt by means of oxide of lead, and to carbonate the caustic soda, while the insoluble chloride of lead was heated to form a yellow pigment, long known as Turner's yellow. Another process consisted in decomposing common salt by sulphate of iron. The resulting sulphate of soda was fluxed with coal, and the sulphide of sodium which was formed was carbonated with sawdust. This plan was also worked some time afterwards at an alkali manufactory situated near Blyth. Another process tried was founded on the neutral decomposition of common salt and sulphate of potash. This operation was regularly carried on by Mr. Losh and Mr. Doubleday, whenever the price of the two potash salts allowed a profit being made, and the chloride of potassium was as regularly sold to the Yorkshire alum makers. Mr. Losh resided in Paris in 1791, where he acquired a knowledge of chemistry, and soon after his return home a company was formed to manufacture soda at Walker. The original partners were Lords Dundas and Dundonald, Messrs. Aubany and John Surtees, and John and William Losh. They obtained their salt from a brine spring found in a coal pit at Walker, and the heavy duty upon salt at that date, which was £36 per ton, was avoided by evaporating together a concentrated solution of the brine spring and sulphuric acid, thus forming sulphate of soda, and avoiding making salt. Another plan adopted by Mr. Losh to avoid the duty was to add ground

coke or ashes to the concentrating salt pan before the salt was formed, and use it in this damaged condition for the manufacture of sulphate of soda. This was about the year 1796; Messrs. Doubleday and Easterby, in 1808, commenced making sulphate of soda be decomposing the waste salts from the soap-boilers, which consisted chiefly of common salt and some sulphate of soda. Their chief supply was obtained from the Messrs. Jamieson and other soap-boilers at Leith. They purchased their sulphuric acid at first, but between 1809 and 1810, they got the plans of chambers from Messrs. Tennants, of Glasgow, and erected the first chamber on the Tyne, at Bill Quay. They imported the first cargo of sulphur from Sicily about the same time, and its arrival in the river excited great attention. At first the Government returned them the import duty on the sulphur which was used in making acid, and the present Mr. Doubleday remembers having received at the end of the year as much as £1,500. This, however, only lasted three or four years, when the duty was repealed. This firm, then trading under the name of Doubleday and Easterby, also erected the first platina retort for making rectified vitriol, and which cost them £700, and before long they had three retorts in operation. The alkali which they made was used in the crude form in the manufacture of soap, in which they were also engaged. In 1816, after the conclusion of peace, Mr. Losh returned to Paris, where he learned the details of the present plan of decomposing sulphate of soda, which he immediately introduced in his works at Walker, and thus may be said to have been the father of the modern alkali trade in this country. Mr. Doubleday gave the plans of his chamber, furnaces, &c., to the Messrs. Cookson, when they commenced their alkali works at South Shields, and these gentlemen made Wright (Mr. Doubleday's foreman) a present of a silver tea service, in consideration of the services he had rendered. This trade has been developed in an extraordinary manner in this locality, where about 47 per cent. of the whole produce of the United Kingdom is now manufactured. The peculiar advantages of the district are also being recognised by the fact that the celebrated firm of Messrs. Tennant have purchased land with the intention of removing the greater part of their works from Glasgow to the banks of the Tyne. Charles Cooper, an overman at Walker Colliery, informs us that he was employed by Mr. Losh in 1798, and that crystals of soda were then manufactured and sold by Mr. Losh. The salt obtained from the brine spring on the premises was evaporated in small lead pans, and was afterwards decomposed by litharge. The soda so produced was crystallised in small lead cones, and when it had stood sufficiently long to crystallise, the cones were turned upside down to run off the mother liquor. The crystallising process was then only carried on in the winter months. C. Hunter, Esq., of Walker, further informs us that in 1816 he sold about half a ton of soda for Mr. Losh, to a Mr. Anderson, of Whitby, at £60 per ton. The following details will embrace a brief account of the source of the raw materials, and the various improvements which have been recently introduced.

Source of Sulphur.—Until within the last few years Sicilian sulphur was almost exclusively employed in this district for the manufacture of sulphuric acid—the pyrites from Wicklow being the only other source of supply. This latter, however, was not sufficiently abundant to render the manufacturer independent of the great fluctuations which have recently taken place in the price of sulphur, on account of the demand consequent on the vine disease. During the last few years the following additional sources of supply have become available. 1st. Belgian, 2nd. Norwegian, 3rd. Spanish or Portuguese, 4th. Italian, 5th. Westphalian pyrites. 1. The Belgian pyrites has the advantage of being shipped at Antwerp at a moderate freight to the Tyne. It is a very hard, compact material, containing about 50 per cent. of sulphur, and therefore nearly approaches a pure bi-sulphuret of iron. The burnt residue from one manufactory on the Tyne (the Walker Alkali Works), after being roasted in a lime kiln to burn off the small remaining portion of sulphur, is regularly used as an iron ore at the adjoining iron works. It contains no copper, and from 3 to 5 per cent. of arsenic. 2. The Norwegian pyrites is shipped at Levanger. It contains 44 per cent. of sulphur, is easily broken, and does not readily flux in the kiln. The quantity of copper it contains being less than 10 per cent., the burned residue cannot be profitably smelted for copper. 3. The most extensively used pyrites is shipped from Huelva, in Spain, and Pomeron, in Portugal. The mines are situated on each side of the boundary between the two countries. They were most extensively worked in ancient times, but their recent development has arisen from the use of the ore as a source of sulphur. Containing only 2 to 4 per cent. of copper, it was unable to compete with the richer ores which from time to time became available in different parts of the world, but the mining is now rendered profitable by the value of the sulphur being realisable as well as that of the copper. The per-centage of sulphur varies from 46 to 50. The practical difficulty in burning this ore, namely, its great fusibility at the point where the combustion of the sulphur gives rise to considerable heat, has been overcome by the adoption of kilns, first used in Lancashire, in which the area of the surface is large in proportion to the weight of the charged pyrites. The use of cupreous pyrites has led to the introduction of the manufacture of copper on the Tyne, which will this year amount to between 700 and 800 tons. The ordinary process of smelting is employed—but the moist method is also being tried; the advantage being that, by this method, all the ingredients of the mineral are utilised, the oxide of iron making an ore of similar quality to hematite. The smelting process, however, is still preferred in the large manufactories. In 1860, several cargoes of an ore containing free sulphur imbedded in gypsum were imported from the Island of Milo, in the Archipelago. From the small quantity of sulphur contained in it (19 up to 24 per cent.) there was great difficulty found in burning it, except the large masses. Subjoined is an analysis of one parcel of it:—Sulphur, 24·00; gypsum, 62·20; sand, &c., 6·00; water, 7·00. Still more recently, Professor Ansted has discovered a deposit of free sulphur in Corfu, of which he has been kind enough to forward a sample, but we believe it has not been used in commerce. When sulphuric acid is wanted quite free from arsenic, Sicilian sulphur must be used. So largely has pyrites displaced sulphur in the production of sulphuric acid, that in 1862 only 2,030 tons of sulphur were consumed, against 72,800 tons of pyrites; and, reckoning the above quantity of sulphur as equivalent to 4,500 tons, it appears that 77,300 tons of pyrites are annually used for the manufacture of sulphuric acid, along with 2,500 tons of nitrate of soda. Assuming a produce of 120 per cent. on the pyrites, this is equal to a production of 92,760 tons of sulphuric acid, calculated as concentrated. This quantity of sulphuric acid is nearly all consumed where it is made, for the manufacture of other chemicals, such as soda and manures, the quantity sold being 64·40 tons, but this might be more correctly described as consumed in other works, for the quantity sent to a distance is very small. Four-fifths of the sulphuric acid is used for the decomposition of common salt.

Salt and the Alkali Trade.—The ordinary Cheshire salt is almost exclusively used for the manufacture of alkali, the exception being in one manufactory, where the waste heat of coke ovens is utilised in evaporating the liquors formed by dissolving rock salt. The anciently extensive salt works of Shields are now represented only by one or two comparatively small manufactories of salt, intended entirely for domestic use. Nearly all the salt used in the alkali works is carried by canal to Hull, Goole, or Grimsby, whence it is brought to the Tyne at a nominal freight, generally by foreign vessels, that take it as ballast when coming to the Tyne for an outward cargo of coals. This is the only practical result of the repeal of that por-

tion of the navigation laws that prevented foreign ships carrying cargoes coastwise. The annual decomposition of common salt in the district is 90,000 tons, requiring 73,800 tons of sulphuric acid, and producing 100,000 tons of dry sulphate of soda. The whole of this quantity is used in the manufacture of alkali. A few hundred tons are consumed in the glass manufacture, but are left out of this account, as no account has been taken of the sulphate of soda made from the nitrate of soda in the sulphuric acid process. The alkali is produced in the four forms of —1. Alkali or soda ash, 43,500 tons; 2. Crystals of soda, 51,300 tons; 3. Bi-carbonate of soda, 7,450 tons; 4. Caustic soda, 580 tons. The manufacture is so well understood, that only local peculiarities and recent improvements need be noted.

ALKALI.—All the Tyne soda ash is fully carbonated, sawdust being generally used in the furnace for this purpose, so that it contains merely a trace of hydrate of soda. The greater part of it is also refined by dissolving, settling, evaporating, and calcining, producing thus an article of great whiteness and purity.

CAUSTIC SODA.—This manufacture is as yet quite in its infancy in this district. In Lancashire, very large quantities are made from the "red liquors" which drain from the soda salts. These liquors always contain caustic soda, sulphuret of sodium, and common salt. In Lancashire, where a hard limestone is used for balling, the per-centage of caustic soda is large, while the sulphuret exists in small proportion, and it is easily oxydized. It would seem that the London chalk which is used here produces a lime, chemically much less energetic, forming less caustic soda, and holding sulphur more loosely in combination. Consequently the Tyne red liquors require a very large quantity of nitrate for their oxydation, and yield so little caustic that this process has been abandoned in favour of the well-known method of boiling a weak solution of alkali with lime. This has the advantage, however, of producing a richer and very pure article, sometimes as strong as 74 per cent.

The improvements (besides such as have been already noticed) which have been introduced into the alkali trade since the last meeting of the British Association in Newcastle, may be divided into those which have been generally adopted, and the special improvements of individual manufactures. 1st. Economy of labour has been attained by using larger furnaces in which a workman can manipulate a larger charge with less toil, and by various other appliances purely mechanical. 2nd. Economy of fuel has been largely attained by the application of the waste heat and flame from the ball furnaces, to the surface evaporation of the tank or black ash liquor. Formerly this was evaporated in hemispherical cast-iron pans, each with a fire below. 3rd. Economy of water and fuel by the adoption of the circulating tanks for lixiviating balls, first introduced at Glasgow, by the late Mr. Charles Tennant Dunlope. They are so arranged as regards their connections with one another, that water runs into the tank which has been most nearly exhausted, and liquor of full strength runs off the tank which has been most recently filled. The balls are always under the surface of the liquor and thus escape the partial decomposition and consequent formation of sulphurate which resulted from the balls being subjected to successive washings and drainings off. 4th. Use of cast-iron decomposing pans. 5th. Gay-Lussac's process for recovering and using again the waste nitrous acid in the manufacture of sulphuric acid, has been adopted by several manufacturers; others consider that the expense of the erections, and of working the process, may be better applied in providing an additional amount of space in the leaden chambers. Special Improvements. —1st. Revolving ball furnaces, invented by Messrs. Elliott and Russel, of St. Helen's, and used in the Jarrow Chemical Works. See Jury Report by Dr. Hoffman. 2nd. In the Walker Alkali Works the waste gas (carbonic oxide) from the blast furnaces of the adjoining iron works is conveyed by flues to the evaporating and calcining furnaces. The advantage obtained is not only economy of fuel, but a hot flame free from smoke and dust, and dispensing with the stoker's labour and tools. For easily regulating the bottom heat of the cast-iron pan in which salt is decomposed, it is found very useful. The carbonic oxide is, however, found not to burn very well in the presence of muriatic acid gas.

HYPOSULPHITE OF SODA.—The manufacture of hyposulphite of soda has largely increased of late years, and we believe in 1838 it was not made at all upon the Tyne. In 1854, the produce only amounted to 50 tons a year. It has gradually risen to 400 tons per annum. In addition to being used in photography, it is largely employed as an "anti-chlor" in papermaking, and from the Tyne the markets of Europe and America are chiefly supplied. In 1852, Mr. W. S. Losh obtained a patent for the manufacture of hyposulphite of soda from soda waste, which has been the means of greatly lessening the price, and consequently extending its application in the arts. On account of its greater stability, hyposulphite of soda has nearly superseded the use of the older salt of sulphite of soda as an "anti-chlor," the latter being chiefly confined to sugar refineries as a de-oxidizer. Dr. Jullion has recently obtained a patent for the production of hyposulphite of lime, to be used as an "anti-chlor," but it has not yet been introduced in commerce, the apparatus for its manufacture in course of erection at the Jarrow Chemical Works being not yet completed.

HYDROCHLORIC ACID.—In the decomposition of common salt vast quantities of hydro-chloric acid are necessarily produced, and it is an important question for chemical manufacturers to apply the best means for its condensation. Since the visit of the Association in 1838, few branches of manufacture have received more attention, and there are few in which greater improvements have been effected than in condensing muriatic acid gas; and this has arisen not only on account of the necessity of preventing injury to agriculture, so that heavy claims for damage might be avoided; but also in consequence of the commercial value attached to hydrochloric acid in the production of bleaching powder, bi-carbonate of soda, oxy-chloride of lead, and other products. The methods generally adopted in condensing are well-known, and we shall only allude to some of the improvements practically applied. The drying furnace usually used is what is called an "open furnace," to which the heat of the fire is directly applied, and we believe that the greatest difficulties in the way of a perfect condensation, in former times, arose with the gases from this furnace. The heat required to drive off the gas from the crude sulphate of soda is very great, and when the gases arrived in the condensers it was found difficult to absorb them, even when a very large quantity of water was used, and the muriatic acid which was thus produced was of so low a strength that it was commercially almost useless. In former years also, the draught through the condensers was always obtained by a connection with a high chimney, but in some of the works this plan is now abandoned, and the whole of the vapour or gas which escapes passes through a 12-inch pipe always open to view. At present these gases are conducted through long flues or pipes and cooling shafts, and on entering the foot of the condensers the heat is reduced to about 140° Fahr., at which point the gases easily condense, and a strong acid is at the same time obtained. A rather different method has been pursued for some time at Messrs. Allhusen and Sons' works. Instead of the heat from the fire being conducted directly on to the drying materials in the furnace, which is generally done, a "close furnace" is used, in which the flame from the fire passes over a brick arch and under the bed of the furnace, and not in immediate contact with the materials; this furnace has no connection with a chimney for its draught, and the gases from both the pan and dryer pass into one condenser. The hydrochloric acid passes off from the furnace unmixed with the smoke from the fire, and at a lower temperature than by the ordinary method; and is consequently more easily condensed, and obviates the neces-

sity of long flues or cooling shafts. Messrs. C. Allhusen and Sons have given us the following results of some recent experiments with this class of furnace. The charge of salt usually used was 8 cwt., the moisture varied from 6 to 9 per cent., and the sulphate of soda contained from 1·75 to 2·25 per cent. of undecomposed salt.

	Salt undecomposed.	Moisture per cent.	Theoretic Weight of Acid.	Acid obtained.	Loss per cent.
1st Experiment ...	1·75	7·0	502.0	495·06	1·4
2nd „ ...	1·70	7·0	498·0	489·00	1·8
3rd „ ...	2·25	7·0	498·0	484·08	2·6
4th „ ...	1·80	7·0	498·0	490·04	1·6
5th „ ...	1·70	7·0	498·0	485·00	2·6

Average loss per cent. ...... 2·0

As a further instance of the care that is now bestowed in condensing, we append also the result of some recent experiments conducted at the Walker Alkali Works, to ascertain the actual quantity of muriatic water condensed. The daily produce was conducted into large stone cisterns prepared for the purpose, and the strength, depth, &c., was carefully ascertained. The salt used was also tested daily for moisture and impurities, such as sulphates, sand, &c. The former was found to average 6 per cent., and the latter 1 per cent., during six months' trial, thus leaving 92·5 per cent. Na. Cl. = 57·7 H. Cl. in 100 parts of salt used.

The crude sulphate of soda produced was also daily tested for common salt left undecomposed, which is deducted below:—

			H. Cl.	Test of Sulphate.
January...	100 Parts of Salt gave ...		58·3	2·59
February .	„	„	53·0	2·24
March ...	„	„	54·2	2·26
April	„	„	57·4	2·14
May	„	„	58·4	2·98
June	„	„	53·9	2·12
Average H. Cl.			55·8	2·45
H. Cl. left in Sulphate of Soda			1·52	
			57·32	
Loss per cent.			0·38	
			57·70	

A patent was obtained in 1860 for the use of the weak acids in the place of water in condensing, which has been successfully carried out in the above works, and it will thus be seen that the whole of the acid produced was obtained and calculated without difficulty. Muriatic acid is not entirely free from impurities, and on account of its containing arsenic, iron, sulphuric acid, &c., it is not applicable to all purposes. The total quantity of hydrochloric acid produced is about 180,000 tons per annum.

MANGANESE.—Manganese is imported from Germany and Spain, but it is chiefly from the latter country that the richest ores are now obtained, which are found in hills consisting of schistose rock, which sometimes rise to a height of 800 feet from the level of the plain; but it is also found in "pockets," and, in the latter case, it is quarried by picks, and occasionally gunpowder is used. The quality of the ore varies from 50 to 90 per cent. per oxide, and to obtain the richer ore men and boys are employed to break and sort it, which is then put into sacks and carried a distance of 20 to 35 miles, on mules' backs, to the ports of shipment in the Mediterranean. The richest ores are obtained at Calanas, in the province of Huelva, 30 miles north of the ancient Roman fishing town of Huelva. We are indebted to Mr. S. F. Gething for this information, who also informs us that he imported to the Tyne in 1857 the first cargo of Spanish manganese. Manganese ore frequently contains peroxide of iron, copper, cobalt, titanium, &c., but no means has hitherto been taken to separate them. Manganese is used in the manufacture of glass, iron, and of bleaching powder; and for the latter it is imported to the extent of 14,400 tons annually. Several patents have been taken out for the recovery of the manganese from the waste chloride of manganese solutions, but generally with indifferent success. The most successful, however, is the process of the late Mr. Charles Dunlop, of Glasgow, in which the manganese is precipitated as a carbonate, and finally oxidised. This patent has, we believe, been successfully worked at St. Rollo, in Glasgow, and has, to some extent, superseded the use of native manganese. Still more recently a patent has been obtained by Mr. Clapham for the separation of the free hydrochloric acid contained in the waste manganese solutions, and for its application in the manufacture of bleaching powder.

FRENCH LIMESTONE, LOCALLY CALLED CLIFF, is imported as ballast from the Seine, and also from the coast of France, to the extent of about 14,000 tons annually. It forms part of the upper chalk bed in the secondary deposits, and is nearly pure carbonate of lime; and although very like chalk in its appearance, differs from it to some extent in being compact, harder, and less susceptible of retaining water. It is always used in this locality in preference to other limestones in making bleaching powder.

BLEACHING POWDER.—Since 1838, the method pursued in the manufacture of bleaching powder has entirely changed, and the quantity made has far more than doubled. At that time it was made by the decomposition of manganese and common salt with sulphuric acid, which was a rather costly process, and the price was about £28 per ton. It is now manufactured from what was at one time the waste muriatic acid referred to above, and the price has been reduced to one-third. During the last few years the demand for bleaching powder has been increased, partly on account of the extensive use of esparto grass from Spain in the manufacture of paper, which has been found to require a large quantity of chemicals to bleach it, and nearly all the Spanish grass imported to this country is shipped to the Tyne. The quantity of bleaching powder now made is 11,200 tons annually.

SOAP.—The first soapery in this locality was begun by Messrs. Lamb and Waldie, about the year 1770, at the Westgate, whence it was removed to the Close. The works were purchased by Mr. Thomas Doubleday, in 1775, and continued under the firm of Doubleday and Easterby until the year 1841. Other manufactories were built in Sandgate and at the Ouseburn, all of which have been abandoned. Very little hard soap was made until the end of the last century; what was used was Castile soap. Up to 1770 soft soap was chiefly used for both domestic and manufacturing purposes. The chief improvements introduced have been the use of Palm oil, bleached by Watts' process, and the manufacture of the ley by boiling the alkali with the lime instead of the so-called "cold process." The total quantity now manufactured exceeds 6,000 tons per annum. The prices of various materials at the present time are as follows:—Tallow, first sort, T. C., 43s. 6d.; fine American resin, 36s. to 39s.; best yellow soap, 33s. to 35s.; best mottled soap, 33s. per cwt.

PRUSSIATE OF POTASH.—The first attempt to manufacture any compound of cyanogen in this district was made in the beginning of the last century, by a Jew, in Oakwellgate, in Gateshead. He afterwards removed his apparatus to Corbridge, but failing in producing a saleable article, he discontinued the operation, which was taken up by a Mr. Simpson, who ultimately succeeded in perfecting the process in works erected at Elswick. Mr. Simpson manufactured Prussian and other kinds of blue colours; and at his death the manufacture was removed to Heworth, where the Messrs. Bramwell have carried on the works since 1758. Prussian blue was the only form in which the cyanogen was produced, from which prussiate of potash was afterwards manufactured. This salt was not known

in commerce in a crystalised form, however, till about the year 1825, when the price was 5s. per lb., which has now fallen to 2s. 11½d. Mr. Bramwell has introduced various improvements in the manufacture of this salt, employing close pots, in which the fused materials are worked by machinery, and in substituting sulphate of potash for the more expensive potashes, but notwithstanding the application of every chemical and mechanical appliance, and the low prices at which the prussiate of potash is sold, the demand has fallen off, and at present only two tons of yellow prussiate and three quarters of a ton of red prussiate are now manufactured weekly. The decline in this trade has arisen partly from the American civil war and partly from the introduction of the analine colours. The celebrated attempt, in 1844, to produce cyanogen from the nitrogen of the air, was made at these works, and although the efforts of Mr. Bramwell and his friends were perfectly successful in a chemical point of view, these gentlemen were induced to abandon the process as a manufacturing operation.

Alum.—The first alum works established in England were erected at Guisbro', in 1460, by Sir Thomas Challoner, who brought over a workman from France to carry out the then secret process, the monopoly of this trade being in the hands of the Pope. The works were subsequently decreed to be a royal mine, and passed into the possession of the crown. They were afterwards farmed to Sir Paul Pindar, at a rental of £15,000 per annum. He employed about 800 persons, and made large profits, his monopoly enabling him to keep up the price to £26 per ton. The Long Parliament restored the mines to the original owners, and, at the Restoration, not less than five works were in operation. The process is well known, but potash alum (formerly the only alum made) is now produced at the Loftus Works, all the other manufacturers employing the cheaper sulphate of ammonia. From the mother liquors large quantities of an impure sulphate of magnesia are obtained, which are partly refined and partly consumed as a manure, mixed with other substances. Alum and sulphate of alumina are also made from sulphuric acid and clay, or shale, but the quantities are not very large. The quantities produced annually are as follows:—Alum, &c., 4,000 tons; rough Epsoms, 1,800 tons. Some improvements in the details have been introduced to economise labour and save materials. The precipitation of the iron from aluminous liquors by means of prussiate of iron was first employed here by Messrs. Lee and Co., and the Guisbro' Alum Company have introduced an aluminous cake, containing sulphate of magnesia, which has been found to answer very well in dying certain colours, as browns, blacks, &c., and in the manufacture of all kinds of coarse paper.

Epsom Salts.—The abundant supply of Dolomite on the coast of Marsden, three miles south of the Tyne, and at other places in the county of Durham, has for many years sustained the manufacture of sulphate of magnesia on the Tyne. The mineral is a tolerably pure double carbonate of lime and magnesia, containing about 21 per cent. of magnesia. Analysis by Mr. Clapham.—Silica 10·00; alumina 1·60; oxide iron 0·50; carb. mag. 35·33; carb. lime 52·50. The process formerly employed was to calcine the limestone, and wash it repeatedly with water, by which, however, the lime is only imperfectly removed, the residue being dissolved in acid and crystallised. The principal source of sulphate of magnesia for many years past has been the rough Epsoms, obtained from the residual mother liquors of the Yorkshire Alum Works. In these salts protoxide of iron replaces a variable proportion of magnesia, forming a double salt and containing also free sulphuric acid.

Analysis of Rough Epsom Salts, by Dr. Richardson:—Sulphuric acid 32·26; magnesia 15·35; protoxide of iron 1·73; oxides of nickel and cobalt 0·12; lime 0·09; alumina 1·33; potash 0·83; water 48·29. Formerly these salts were mixed with washed magnesia lime, and then calcined, in order to peroxidise the iron. It is found, however (as first suggested by Dr. Richardson), that calcination is unnecessary when the solution is sufficiently diluted, and when space is provided in the precipitating tank for the bulky precipitate of protoxide of iron, which is formed by the gradual addition of magnesian lime. This is probably the only chemical manufacture of the district, with the exception of prussiate of potash, which has greatly fallen off in extent, a more rational system of medicine having diminished the use of purgatives, and reduced the demand for Epsom salts to about one-third of what it was 20 years ago. The annual production is still 1,500 tons, two-thirds of which are made from the rough salts.

Carbonate of Magnesia.—This compound has long been produced in this district, where it was formerly, and is still to a limited extent, manufactured from the mother liquors of the salt pans, known as bittern, to which carbonate of soda is added to precipitate the magnesia in the form of carbonate. This old process has been largely superseded by the elegant process of the late Mr. H. L. Pattinson, which consists in submitting calcined magnesian limestone to the action of carbonic acid and water, under pressure. The magnesia dissolves out as bi-carbonate of magnesia, from which the neutral carbonate of magnesia is precipitated by the application of heat. The quantity manufactured is said to be about 250 tons per annum.

Superphosphate of Lime.—The manufacture of this article was commenced at Blaydon in 1844, by Dr. Richardson, soon after the publication of Liebig's celebrated report on agricultural chemistry. Various materials are employed as the source of phosphate of lime, viz., bones, bone ashes from South America, exhausted animal charcoal from the sugar refineries, coprolites from Suffolk and Cambridgeshire, phosphate from Spain, Sombrero guano, &c. Improvements have been introduced in the manner of mixing the acid with these substances, in drying the superphate, and in the riddling of the superphosphate. The quantity produced amounts to between 1,500 and 1,600 tons per annum.

Peal Hardening.—This article has only recently been manufactured here, and its introduction is due to Dr. Jullion, who has applied it to the hardening of paper. It is produced by precipitating hydrated sulphate of lime from a perfectly pure solution of chloride of calcium, by means of sulphuric acid. Great care is taken in its preparation, and it is being generally introduced among the manufactures of paper. The quantity made is said to be about 2,000 tons per annum.

Sulphate of Iron.—The first manufactory for the production of green copperas in England, was founded about the year 1579, when one Matthew Falconer, a Brabanter, "did try and draw very good brimstone and copperas out of certain stones, gathered in great plenty on the shore, near unto Minster, in the Isle of Sheppy." Mr. Thomas Delaval commenced to manufacture copperas at Hartley, about the year 1748, but he subsequently sold the manufactory to his brother, Lord Delaval, and by an Act of Parliament, 11th of George the III., in 1771, power was given to Sir Francis Blake Delaval, to grant to Sir John Hussey Delaval, in fee simple, all the copperas works, then and there existing, which may enable us to form some idea of the importance then attached to this manufacture. The late Mr. Barnes and Alderman Forster erected the the first copperas works on the Tyne, at Walker, in 1798, which are still in operation. The quantity at present manufactured is about 2,000 tons per annum, and the process is still the same, but Mr. Thomas Barnes has applied the refuse crystals to a novel purpose. This refuse was, and is, generally thrown away, but Mr. Barnes uses it as a manure on his farm, on the thin soil which lies on the magnesian limestone. He finds that the depth of the soil is gradually increasing by the disintegration of the rock, and that the more he uses, the more satisfactory are the results. The beneficial effort of the copperas is doubtless partly due to the natural decomposition of the carbonate of lime with the sulphate of iron, and partly to the action of the peroxide of iron

on the organic matter of the soil, while being constantly renovated, a supply of oxygen is provided in a solid form, by this hydrated oxide of iron.

VENETIAN RED.—The manufacture of this article has long been carried on in this neighbourhood, and is noticed here, as it is so closely related to green copperas. It is made by calcining a mixture of copperas and some native hydrated oxide of iron, chalk, and gypsum. The calcined mass is levigated and dried. About 4,000 tons per annum are manufactured on the Tyne, and the price varies from £4 10s. to £5 per ton.

SULPHATE OF COPPER.—This salt was formerly produced by roasting old copper in a reverberatory furnace, and then dissolving the oxide in sulphuric acid, but it is now obtained in carrying out Longmaid's process for decomposing common salt by means of cupreous pyrites. The quantity made is about 100 tons per annum, which is all produced at the works of Messrs. J. and W. Allen.

RESIN SIZE.—This article is manufactured according to a patent obtained by Mr. W. S. Losh, and is intended to produce a size suitable for paper makers, and to supersede the old size in ordinary use, which consists of alum, resin, and soda ash. Its manufacture has, however, been only partially developed, and not more than 100 tons yearly is produced, but a new and cheap size, which can be prepared ready for the use of the paper trade, is, we think a step in the right direction, and the theory of the sizing of paper is a field still open to chemists.

LAMP BLACK.—The manufacture of lamp black, we believe, is peculiar to this locality, and it is produced from bituminous coals. These coals are slowly burnt, at a dull heat, and with as small a supply of air as possible. The smoke is conducted into brick chambers, into which a jet of steam or water is passed to assist in the better formation of the lamp black. The quantity made is about 1,200 tons annually.

GREASE.—This is another local product, and is made to the extent of 2,800 tons annually. It is chiefly produced from the distillation of resin, and in a locality like Newcastle, surrounded by extensive collieries and works, the consumption is considerable. Since the American war the price has been much affected, and we are told has advanced from £8 or £9 per ton to £22 per ton.

QUANTITIES AND PRICES.

Raw Materials.	Tons.	Price. £	s.	d.	Value. £	s.
Sulphur (included as Pyrites). (Copper value not included.)	72,800	0	10	0	109,200	0
Salt	90,000	0	15	0	67,500	0
Nitrate of soda	2,500	14	15	0	36,875	0
Chalk	144,000	0	2	6	18,000	0
Coals	323,000	0	3	9	60,562	10
Manganese	11,400	4	0	0	45,600	0
Rough Epsom salts	1,500	2	5	0	3,375	0
Magnesian limestone	700	0	3	6	122	10
French limestone	14,000	0	4	6	3,150	0
Resin	......			....		
Tallow	......			....		
Finished Products.						
Alkali	43,500	8	10	0	369,750	0
Crystals of soda	51,300	4	15	0	243,675	0
Bi-carbonate of soda	7,450	12	0	0	89,400	0
Caustic soda	580	18	0	0	10,440	0
Hyposulphite of soda	400	25	0	0	10,000	0
Oil of vitriol	6,440	6	0	0	38,640	0
Epsom salts	1,500	7	5	0	10,875	0
Hydrochloric acid	180,000			....		
Sulphuric acid used in the manufacture of soda	86,320			....		
Bleaching powder	11,200	9	0	0	100,800	0
Soap	6,000	34	0	0	204,000	0
Yellow prussiate of potash	105	0	1	0 per lb.	11,760	0
Red do.	40	0	2	6 per lb.	11,200	0
Alum	4,000	7	0	0	28,000	0
Carbonate of magnesia	250	30	0	0	7,500	0
Superphosphate of lime	15,000	5	0	0	75,000	0
Pearl hardening	2,000	10	0	0	20,000	0
Sulphate of iron	2,000	3	0	0	6,000	0
Venetian red	4,000	5	0	0	20,000	0
Sulphate of copper	100	35	0	0	3,500	0
Resin size	100	7	0	0	700	0
Lamp black	1,200	7	0	0	8,400	0
Grease	2,800	8	0	0	22,400	0
Cements	12,000	2	0	0	24,000	0

PYRITES.

Mr. JOHN PATTINSON gave an abstract of a paper "On the various kinds of Pyrites used on the Tyne and Neighbourhood, in the Manufacture of Sulphuric Acid." Iron pyrites, or sulphate of iron, he said, had been used on the Tyne as a source of sulphur in the manufacture of sulphuric acid since about the year 1840. In this locality a few hundreds of tons of sulphur per annum are now only made into sulphuric acid, which is concentrated and sold for special purposes, for which the acid from pyrites is unfitted, owing to its containing a small quantity of arsenic; whilst about 75,000 tons of pyrites are annually consumed, containing on an average 34,000 tons of sulphur, and representing a value of about £110,000. The remainder of the paper was chiefly taken up with details respecting the amount of pyrites used on the Tyne and an analysis of the substance. Cleveland pyrites is found between the beds of ironstone of the Cleveland District, in Yorkshire, and is only used at one large sulphuric acid manufactory, situate at Middlesbro'. The deposit varies from 6 to 12 inches in thickness, and consists of concretions of oolitic particles of pyrites, mixed with ironstone, which crumble to pieces on exposure to the air. On an average, it only contains about 25 per cent. of sulphur. Of the "coal brasses" variety, from 6,000 to 8,000 tons are used on the Tyne per annum. It is found in the collieries of the district, associated with the coal. Besides iron pyrites and coal, this substance often contains variable quantities of carbonate of lime and oxide of iron. What the future of the pyrites trade may be it is impossible to foresee, but this mineral exists in such inexhaustible abundance, that its use in the manufacture of sulphuric acid is not likely to be superseded by sulphur, unless new and cheaper sources of the latter are discovered.

Mr. SPENCE stated the fact that at the present moment in Swansea, as much sulphur was being thrown off in the form of sulphurous acid gas as would make all the sulphurous acid gas used in our immense chemical manufactories. His own calculation was that they were throwing into the atmosphere there a quantity equivalent to about 4,500 tons of sulphuric acid per week. Hitherto it had been impossible to use that in the manufacture of sulphuric acid. At least, there was no plan that had been generally adopted that could be made useful. He (Mr. Spence), however, had recently devised a furnace by which he was using pyrites, and if it were adopted by the Swansea smelters, they could manufacture all the sulphuric acid at actually almost no cost. The subject was worthy of consideration.

EXAMINATION PAPERS, 1863.

(Concluded from page 699.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May:—

FREE-HAND DRAWING.

THREE HOURS ALLOWED.

Make a drawing in outline of the cask and wheelbarrow which is in the room, and indicate the strong points of the shadows as they appear to you.

Draw, from recollection, a branch of a vine with leaves and fruit.

Make an enlarged outline, not less than eight inches in length, from the Queen's head on the new bronze coinage.

Make an original design, either for ornament or in figure, the subject given being, a parasite.

Candidates are not expected to attempt all the subjects given in this paper.

DIRECTIONS FOR THE LOCAL BOARDS.

Put a thirty gallon cask on a wheelbarrow, and place it in the room before the candidates in free-hand drawing.

Supply each of the candidates with a penny-piece of the new bronze coinage.

GEOMETRICAL DRAWING.

THREE HOURS ALLOWED.

The constructions must be accurate, and show clearly, by plain and dotted lines, with appropriate letters of reference, the principles on which they are based. They may be put in ink, or left in pencil, at the discretion of the candidate, provided they are distinct.

No deviation from the conditions of the questions can be admitted; and since no candidate must answer more than two questions from any one section, he is advised not to attempt more than the time will admit of his completing, since little or no credit will be given for incompleted or inaccurate answers.

I.

1. Draw a circle of 1·5 inches radius; inscribe and circumscribe it with squares, having their sides parallel.
2. Draw a square of three inches side, divide it into 64 equal squares, put a light tint of Indian ink on thirty-two of them so as to form a chess board.
3. Draw sixteen equal circles of ·75 inches in diameter, their centres being in the intersections of four parallel lines, 1·5 inches apart, with four others at the same distance, and at right angles to them.
4. Draw a circle of two inches radius; divide its circumference into six equal arcs; describe an arc of a circle of two inches radius from each point of division, stopping these arcs at the circumference of the first, and each arc passing through its centre.

N.B.—These questions are intended to test the candidate's neatness and accuracy.

II.

1. Draw in one figure two squares of one and two inches *area*.
2. Draw a semi-circle of 1·5 inches radius; determine a point in its circumference such that the chords drawn from it to the ends of the diameter shall be as $1 : \sqrt{2}$.
3. Construct a rectangle of three inches area, and having its sides as 2 : 3.
4. Draw a regular pentagon of 1·5 inches side, and a square equal to it in area.
5. Construct a triangle having its sides as 2 : 3 : 4, but inscribed in a circle of 1·5 inches radius.
6. Draw a triangle, its sides being 2, 2·5, 3 inches; bisect this triangle:—
   1. By a line parallel to one side.
   2. By a line perpendicular to one side.

III.

1. Draw a circle of 1·5 inches radius: in it inscribe four equal circles, each touching two others.
2. Two circles of 2 and ·75 inches radii touch one another internally; draw a third circle of one inch radius to touch both, but not at the point of contact of the first two.
3. Draw an ellipse having its axes 3·5 and 2·5 inches, without using the foci.
4. Draw the curve line, every point of which is equidistant from a given straight line, and a point at one inch from that straight line.

IV.

1. The sides of a rectangle are three and two inches long; draw the *plan* of it when those sides are inclined to the paper 40° and 60°.
2. An equilateral triangle of two inches side has its three corners at 1, 2, and 2·5 inches above the paper. Draw its *plan*.
3. The plane of a square of two inches side is inclined at 50°, and the diagonal is inclined at 30°. Draw its *plan*.
4. Two diameters, containing an angle of 60°, of a circle of two inches radius, are inclined at equal angles of 35° to the plane of the paper. Draw the *plan* of the curve.

V.

A right pyramid, four inches high, has for its base a pentagon of 1·5 inches side. Draw a *plan* and *elevation* of the solid under the following conditions of position:—

1. When one *face* is horizontal.
2. When one *edge* is horizontal, and the plane of an adjacent face inclined to the paper at 26°.
3. When two faces are vertical.
4. When it is suspended freely from one corner of the base.
5. The solid is cut by a plane parallel to one face, and at ·3 inch from it. Draw the form of the section.
6. Show the *developed* surface of the frustum.

VI.

1. A right cone, four inches high, with a circular base of 1·5 inches radius, stands on the paper; it is touched by three equal spheres, each of which touches the other two. Show a plan of the whole.
2. Two equal triangular pyramids, all the faces of which are equilateral triangles of 2·5 inches side, are placed with two faces in contact, so that the edges of one are opposite the centre line of the faces of the other pyramid; all these faces being supposed produced, determine the mutual intersection of the two, and draw a plan and elevation of them.
3. The axes of two equal cylinders, 3·5 inches long and 3·5 inches in diameter, meet at right angles in their centres. Show the two solids penetrating each other in isometrical projection.
4. A square of two inches side is parallel to the plane of projection (the picture). Determine its distance from that plane when its perspective projection is a square of equal area, half its area, or double its area, the distance of the eye being five inches.

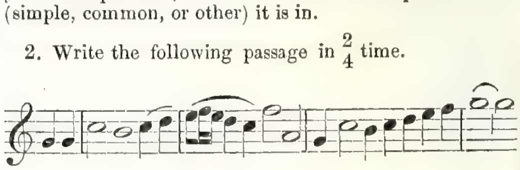
MUSIC.

THREE HOURS ALLOWED.

I. Rudiments of Musical Grammar.

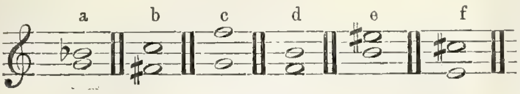
(The answers to Nos. 1 to 4 must be written on music-paper.)

1. Give an example of every kind of time with which you are acquainted, and write over each example *what* kind (simple, common, or other) it is in.
2. Write the following passage in $\frac{2}{4}$ time.



3. Transpose the following into *Do* (C) minor.

4. Write the signatures of *Fa* (F), *Sol* (G), and *La* ♭ (A ♭) *major*; and of *Re* (D), *Mi* (E), and *Fa* (F) *minor*.
5. Explain what is meant by the inversion of an interval, and state what change (of quality) each diatonic interval undergoes on inversion.
6. Name the intervals formed by the following, specifying the quality (major, perfect, or other) of each:—



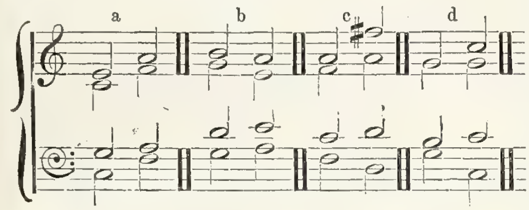
7. In what scale, or key, is the following:—

8. What modulations are we likely to find in a piece of music in the scale, or key, of *Re* (D)?

II. HARMONY, COUNTERPOINT, AND MUSICAL HISTORY.

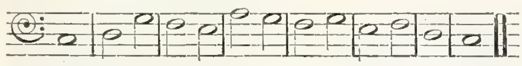
(The answers to Nos. 1, 2, and 3, must be written on music paper.)

1. Correct the errors in the following with as little alteration of the parts as possible:—



2. Add three parts to the following figured bass:—

3. Add a part, or parts, in any species of counterpoint, above or below the following:—



4. What is there exceptional, or objectionable, in the following progression:—

5. In what countries were the following composers born, and in what centuries did they flourish:—Arne, J. S. Bach, Croft, Orlando Gibbons, Haydn, Josquin des Près, Mozart, Palestrina, Purcell, Rossini, Tallis.

Home Correspondence.

ON DECIMAL DIVISION.

SIR,—Sir William Armstrong refers to this and to the Metric System. There cannot be a doubt but that decimal division affords great facilities, and may, with very little alteration, be applied in this country without adopting the French method.

Sir William refers to the decimal of an inch, but that does not afford the extent of the facilities which the decimal of a foot will give. Had Mr. Penrose not used the decimal of a foot in taking the measures of the Parthenon, and indeed Professor Greaves, in 1637–38, in taking the measures within the Great Pyramid, their exact geometrical proportions could not have been discovered. The decimal of a foot is, therefore, all that is required to facilitate calculations wherever the standard English foot is used. This will afford facilities for determining measures of length, surface, or capacity, both beyond and below the foot, to the greatest extent and the minutest expression that can be required. All this those who have used the decimal of an inch will easily comprehend; and children may be taught with great facility to understand and apply it.

Then the only alteration required to reduce all cash accounts to decimals, is the division of the English shilling into ten. All accounts may then be expressed in pounds and the decimal parts of a pound sterling, and every coin in circulation, to which may be added, if thought necessary, coins to represent the decimal parts of the tenth of a shilling.

In this way, with the least possible alteration, measures of capacity and weight, for commercial purposes of magnitude requiring facility and constant calculations, may as readily be made decimal.

These, it is submitted, may be quite sufficient for a first experimental step; and as these become familiar, and the way appears clear, if necessary, the decimal system may be applied to chemical weights and measures; but there would be great danger to legislate on that at present.

The decimal division of a circle would be attended with great disadvantages. The number of divisions representing a chord equal to the radius cannot thus be expressed, and there are many other objections to such a division of a circle.

For all those who may require to express accounts of any kind—English in French, or French in English—the decimal system will afford much facility.

JOSEPH JOPLING.

6, Vassall-terrace, Kensington, London, W.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, September 4th*, 1863.]

Dated 22nd August, 1863.

2086. R. A. Brooman, 166, Fleet-street—A new metallic alloy. (A com.)
2087. L. E. C. Martin, 32, Albion-street, Hyde-park—Imp. in apparatus for heating and purifying water.
2088. S. Moore, Liverpool-street, Bishopsgate-street—Imp. in the means of and apparatus for electro-plating, said apparatus being also applicable to medical purposes.
2090. W. Benson and P. W. Greenwood, Leeds—Imp. in preparing and spinning wool and other similar fibres.

Dated 24th August, 1863.

2092. A. Jobson, Darlington, Durham—Imp. in machinery for drawing or discharging coke ovens and loading coke waggons.
2094. C. S. Grasset, Larnoca, Cyprus, Turkey—An improved double Mac-Carty gin or machinery used for cleaning cotton from its seeds.
2095. A. Capello, 4, Rue du Repentir, Marseilles—An improved method of and apparatus for glazing morocco leather.
2097. H. F. McKillop, R.N., Belvedere, Kent—Imp. in cleansing ships' bottoms.
2098. R. A. Brooman, 166, Fleet-street—Imp. in air and gas engines (A com.)

Dated 25th August, 1863.

2100. G. E. Lewis, H. Walker, and J. B. Wayne, Birmingham—Imp in breech-loading fire-arms.

Dated 26th August, 1863.

2104. T. Hopkins, jun., White Hart-place, Kennington-cross—Imp. in carriage door handles.
2105. J. Taylor, Gomersall, Yorkshire—Imp. in the manufacture of soap. (A com.)
2108. T. Westhorp, Falcon Works, Bromley—Imp. in machinery or apparatus for preparing cut rope strands or yarn for carding into oakum.
2109. R. Johnson and G. Bedson, Manchester—Imp. in pointing wire rods or wire, in order to facilitate their introduction into draw plates.

2110. W. E. Newton, 66, Chancery-lane—Improved apparatus for extracting coal ores or other minerals or substances from mines, which apparatus may be also employed for raising and lowering the workmen and their tools or implements. (A com.)
2111. J. Platt and W. Richardson, Oldham, Lancashire—Imp. in stoves or grates.
2112. J. Fry, Chesham, Buckinghamshire—Imp. in mashing machinery used in making fermented liquors.
2113. D. Blake, Manchester—Imp. in shaping and punching metallic articles, and in the machinery or apparatus to be employed therein. (A com.)
2114. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in obtaining and applying motive power. (A com.)

[*From Gazette, September 11th*, 1863.]

Dated 27th June, 1863.
1615. G. Clark, 30, Craven-street, Strand, Westminster—Imp. in the construction of guns and projectiles, and of carriages, platforms, and shields for working and protecting guns.

Dated 22nd July, 1863.
1834. C. Senior, Dead Waters, near Huddersfield—Imp. in means or apparatus for closing, punching, and rivetting hose pipes of leather or other substances, applicable also for punching and riveting mill bands or driving straps, and similar purposes.

Dated 28th July, 1863.
1870. M. Cockerell, 3, Munden-terrace, Hammersmith—The imp. of mortice and other door locks and latches.

Dated 6th August, 1863.
1937. J. E. Dowson, 4, Victoria-street, Westminster—A new application of rolled metal plates to the formation of roadways, bridges, tramways, and other structures.
1943. W. Clark, 53, Chancery-lane—Imp. in taps or stopcock apparatus. (A com.)

Dated 10th August, 1863.
1967. J. A. Fullerton, Manchester—Imp. in the method of fastening hoops for packing bales, and in the machinery or apparatus employed therein.

Dated 17th August, 1863.
2038. H. A. Bonneville, 38, Porchester-terrace, Bayswater—Imp. in engraving. (A com.)

Dated 18th August, 1863.
2044. J. Broadley, Saltaire, near Bradford—Imp. in means or apparatus employed in weaving.

Dated 21st August, 1863.
2077. R. Thompson, New Charlton, Kent—Imp. in machinery for planing curved, curvilinear, irregular, and other forms in iron, steel, and other metals.
2082. J. B. C. Lange, Paris—An improved apparatus for indicating or registering the speed or distance travelled by vehicles, carriages, and such like, which said apparatus is also applicable to engines, water-wheels, and prime motors of any description.

Dated 25th August, 1863.
2099. A. Hett and F. W. Basset, Camberwell—Imp. in preserving animal substances, and animal and other substances used for food.

Dated 26th August, 1863.
2106. J. L. Kessler, Paris—Imp. in apparatus for evaporating and distilling.
2107. S. Fattorini, 3, Rue Joubert, Paris—A new division of time, and the application thereof to mathematical and other instruments.

Dated 27th August, 1863.
2118. J. Ward, Liverpool—Imp. in diving apparatus.
2120. W. E. Newton, 66, Chancery-lane—Imp. in breech-loading firearms. (A com.)

Dated 28th August, 1863.
2122. G. Davies, 1, Serle street, Lincoln's-inn—Imp. in the manufacture of iron and steel from the cinders and refuse of puddling and other furnaces, and from certain kinds of ores. (A com.)
2124. J. Shaw, New Wortley, Leeds—Imp. in machines for cutting or reducing turnips or other roots as food for animals.
2126. E. Amourous, 4, South street, Finsbury—Imp. in apparatus for separating solid from fluid fecal matters.
2128. J. Alison, Reigate—Imp. in apparatus for tilling land, which improvements are chiefly applicable when steam power is employed.
2130. J. Walls, Farington, near Preston—Imp. in steam boilers, and in apparatus connected therewith.

Dated 29th August, 1863.
2134. T. Williams, Manchester—Imp. in machinery or apparatus for crushing and flattening the stalks of tobacco and other substances.
2138. D. Speirs, A. Boyd, and J. Kirkwood, Paisley—Imp. in looms for weaving.
2140. F. C. P. Hoffmann, Newgate-street—Imp. in shears for cutting metal and other substances.
2142. A. Rowand, Glasgow—Imp. in evaporating fluid solutions, and in the machinery, apparatus, or means employed therein.
2144. L. E. C. Martin, 32, Albion-street, Hyde park—Imp. in apparatus for generating steam, and for generating gases to be used for heating steam boilers, and for other purposes.

Dated 31st August, 1863.
2146. H. E. Kramer, Leipsic, Saxony—Imp. in printing in colours pictures or devices to be used in ornamenting porcelain, stoneware, earthenware, or any other substances where the colours can be annealed or melted or burnt in.
2150. W. E. Gedge, 11, Wellington-street, Strand—An improved watch. (A com.)
2154. G. B. Pettit, Oxford-street—A method of preparing mica and talc, in order to render them applicable to articles of wearing apparel, and to ornamental purposes.

Dated 1st September, 1863.
2162. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of illuminating gas. (A com.)
2164. G. W. Ewens, Sherborne-lodge, Dorris-street East, Kennington Cross—Imp. in the manufacture of wadding paper and felted fabrics, and in the preparation of vegetable fibres to be used in such manufactures.

Dated 2nd September, 1863.
2166. J. Lewis, Manchester—Certain imp. in machinery or apparatus for preparing and drying clay, and also in machinery to be employed in the manufacture of bricks and tiles.
2170. C. H. Corlett, Gustrow, Mecklenburg-Schwerin—Imp. in valves, taps, or cocks.
2172. F. C. P. Hoffmann, Newgate-street—Imp. in machines for crushing hard substances, for washing ores and minerals, and for separating earth and earthy matter from solid substances.

Inventions with Complete Specifications Filed.

2179. H. A. Bonneville, 38, Porchester-terrace, Bayswater—An improved mode of attaching horses to carriages or other vehicles, and apparatus therefor. (A com.)—3rd September, 1863.
2180. H. A. Bonneville, 38, Porchester-terrace, Bayswater—An improved machine for glossing and glazing all kinds of threads. (A com.)—3rd September, 1863.

Patents Sealed.

[*From Gazette, September 11th*, 1863.]

September 11th.
608. P. Adie.
663. J. Cassell.
665. W. R. Mulley.
666. H. Wilson.
672. J. Renshaw.
673. W. Rossetter.
674. F. Buser-Kraushaar.
675. H. D. Taylor and J. W. Taylor.
679. J. Polkinghorne.
680. H. B. Barlow.
687. J. H. Johnson.
692. J. Page.
695. R. Alexander.
699. J. Walworth.
703. T. W. Willett.
709. W. G. Eavestaff.
712. W. H. Atkinson.
713. W. E. Gedge.
715. J. Cox.
719. W. Symington.
720. W. C. Wild and J. H. Randel.
721. W. Donbavand and D. Crichton.
723. R. A. Brooman.
724. F. Richmond, H. Chandler, and J. G. Richmond.
727. B. Wren.
729. T. Oldknow.
737. H. O. Haughton.
751. J. Brigham and R. Bickerton.
767. W. Clark.
773. A. Topham, J. Topham, and J. Topham.
790. M. L. Parnell.
807. J. King and T.H. Marshall.
832. H. Hamer.
833. J. M. Dunlop.
838. M. Henry.
881. A. V. Newton.
902. A. V. Newton.
904. A. V. Newton.
1035. L. A. J. Bruet.
1066. J. H. Johnson.
1071. G. Davies.
1194. H. L. Emery.
1376. D. Wilson and E. A. Cowper.
1424. W. E. Newton.
1574. C. T. Burgess.
1642. H. Hutchinson.
1690. G. P. Reed.
1702. W. E. Newton.
1726. R. Hornsby, jun., J. Bonnall, and W. Astbury.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, September 15th*, 1863.]

9th September.
2184. T. Thornton, E. Thornton, and J. Thornton.
2193. R. C. Clapham.
2209. N. Thompson, jun.

10th September.
2202. F. A. N. Freppel.
2233. R. Mushet.

11th September.
2207. J. Wright.
2210. A. Ransford.
2247. J. M. Napier.
2280. M. Sautter.
2344. T. Brookes and T. Adams.

12th September.
2205. R. H. Gratrix and M. P. Javal.
2225. J. Petrie.

Patent on which the Stamp Duty of £100 has been Paid.

[*From Gazette, September 15th*, 1863.]

7th September.
2126. J. Milnes & W. Thompson.

8th September.
2149. C. Hill.

9th September.
2113. J. Taylor.

11th September.
2142. E. Green.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 25, 1863.

THE LATE WM. TOOKE, PRESIDENT OF THE SOCIETY.

On Sunday last, the 20th instant, in the 86th year of his age, died William Tooke, Esq., F.R.S., the President of this Society. Mr. Tooke had been sixty-one years a member of the Society, having been elected in 1802. He long took a very active part in its management; and when, many years since, it was in a depressed state, he afforded it valuable assistance. On the death of His Royal Highness the Prince Consort, Mr. Tooke, then the oldest Vice-President, was elected to fill the vacancy thus created, and to the last he evinced a deep interest in all the proceedings of the Society.

Mr. Tooke was trained to the study of the law, and, having been admitted a solicitor, practised his profession for some years in London. Science, art, and literature had, however, greater attractions for him, and to their cultivation he devoted his energies. In 1804, he published anonymously an edition of Churchill's poetical works, which were re-published among the Aldine Poets, with the editor's name, in 1844. In 1855, he published a work entitled "The Monarchy of France, its Rise, Progress, and Fall;" having meanwhile given to the world several smaller productions. In conjunction with Lord Brougham, Dr. Birkbeck, Mr. Grote, and others, he took an active part in the establishment of the Society for the Diffusion of Useful Knowledge, and for a considerable period acted as its treasurer. For two years—namely, from 1835 to 1837, during the administration of Lord Melbourne—Mr. Tooke represented the borough of Truro in Parliament. He was born at St. Petersburg, and was the son of the Rev. William Tooke, an English divine and writer, who became chaplain to the factory of the Russian Company in that city, and was the author of a "Life of Catharine II.," "A View of the Russian Empire," and other works.

THE COMMERCE OF ABYSSINIA.

The following is the report by Vice-Consul Walker on the commerce of Abyssinia for the year 1863 :—

Having recently returned from the coast of Abyssinia, after a residence there of many months, and thinking your lordship would be glad to be informed of the present state of commercial affairs in that neighbourhood, I have the honour to transmit the following report, in the hope that it may not be unacceptable to your lordship. Most of the commerce of this country, which would be considerable if there were no drawbacks thereto, it being so richly endowed by nature, is brought to Massowah, an island on the coast, which is merely a coral rock not more than a mile and a quarter in circumference, and which is about 200 yards from the main land. This island is governed by a Kaimakan, or governor, who is subject to the Pacha of Jeddah. It consists of his residence, which is almost the only tolerable house in the place—a ruinous fort or tower—a few warehouses of stone belonging to the Banians (who have transacted business with the Abyssinians for some years); a custom-house of stone in a most dilapidated state; a residence of stone belonging to the Jesuits, and a church which that fraternity are at present constructing; one or two ruinous mosques; a small stone house consisting of two miserable rooms which have been used lately as the consulate of her Britannic Majesty; two dilapidated houses used for similar purposes some years back by the French and Austrian governments; a dirty bazaar, and a numerous collection of miserable straw huts inhabited by the Arab and small Turkish population.

The whole of the export from the interior is brought down by porters, who are employed by the merchants twice a year—viz., in the end of February or commencement of March, when the rains are subsiding on the coast; and before the rains have set in in the interior another caravan, in the end of August, which leaves before the rain commences again on the coast. These caravans, when they arrive at a place called Ailat, which is situated on the plains of the low country, and about two days' journey from the coast, discharge their porters; their pay from Adona to Ailat is a dollar a head.

The country about Ailat consists of low sandy plains, which allow of their goods being safely conveyed on camels, mules, and oxen to the coast, when they are at once unloaded on a kind of stone quay which projects into the sea opposite the island, and immediately shipped across to Massowah, where they are detained in the custom-house till the proper tariff (8 per cent.) is levied on them.

We have no English merchant vessels at any time trading with Massowah. Two Indian or Banian vessels visit it during the year. No Turkish vessels go there at all, neither naval or merchantmen, but about thirty Arab bagalows are continually going backwards and forwards to Jeddah, Suez, Addeido, and Mocha, and occasionally to Aden, during the year. These boats are open, without a deck, with one or two latteen sails, some made of mat, some of canvas, and they seldom, if ever, lose sight of land, but are constantly hugging the shore, and when night sets in come to an anchor.

The articles of commerce which are brought from the interior of Abyssinia consist of small quantities of negro gold, ivory, musk, coffee, ghee (or rancid butter), hides, cotton, and a kind of coarse grain called dourah, much used by the natives for making their bread (there are two kinds, the red and white: the latter is the most expensive), honey and wax. The quantities of these articles brought by the two caravans during the year, as far as I was able to ascertain, consist of: Gold—great difficulty to ascertain the quantity that is brought from the interior, as a great deal is smuggled in to avoid the duty; ivory, 13,000 lbs.; musk, 560 lbs.; coffee, 10,000 lbs.; ghee, no tariff—constantly arriving from the frontier; hides—constantly arriving; cotton—small quantities brought to the coast, cultivated more for home consumption; corn, Dourah honey—always arriving in small quantities; great difficulty to ascertain the amount; wax—10,000 lbs.

The annual number of mules brought from the interior is about 1,200, their loads averaging from 250 lbs. to 280 lbs. each. Butter, honey, and hides in small quantities at all times in the year. Corn and dourah also. The value merely of goods arriving from the interior is given, not the weight. The whole of the gold is bought up by the Banians of Massowah, as is also the ivory. The gold is sold by the Maria Theresa dollar weight, viz., one dollar weight of gold is sold for 16 dollars. The ivory is sold at a dollar per rottoli, which is equivalent to our English pound. The whole of this article is also bought by the weight, either for specie or barter. The musk, which is brought down in small quantities on account of its scarcity, is consequently very dear, about 12 dollars the ounce. The price of coffee all depends on what quan-

tity there is in the market; when the large caravan arrives from the interior in the end of August, it averages from 8 to 9 rottoli the dollar. The price of ghee is about $3\frac{1}{2}$ robeit the dollar. The robeit is equivalent to $1\frac{1}{2}$ lbs. The price of common hides averages from $\frac{3}{4}$ of a dollar to a dollar a head. Spotted panther skins at a dollar and a dollar and a half each. Cotton, which is brought down in small quantities, is sold for 8 to 9 rottoli the dollar. Corn is sold by the kale, and generally runs from 9 to 15 kale the dollar. The price of dourah is the same as the corn. Honey and wax are sold at the following prices:—The honey is sold at $3\frac{1}{2}$ robeit the dollar; the wax 1s., or 6 piastres, the cake, which is round, and about the size of a saucer.

There are about 15 to 20 Banian merchants on the island of Massowah, and they are in fact the only men who possess any money on the island. They have two vessels of their own, which are built similar to the bagalows, but far larger, which trade between the island and Bombay twice in the year. About 20,000 dollars yearly is expended in the country, money being scarce; the rest of the mercantile transactions are carried on by way of barter by the Banians, who seem to monopolise the whole of the trade.

Imports into Massowah.—These Indian merchants generally bring to the island quantities of red damask silks and coarse white cloths, called bafta, which the natives, residing on the coast, wear thrown around their bodies, (the Abyssinians spin their own togas); they also import moist sugar, sugar candy, printed cottons, coloured beads, and rice.

The dwellings of the three consuls, English, French, and Austrian, as also of the one or two Europeans, have always been situated on the main land three miles from the island, at a place called Montcouloo. The whole of this low sandy plain to the length of 60 or 70 miles is under the power of the Turks, who have a small garrison, to the amount of 100 men, chiefly Arabs, stationed at Arkeeko, which is about three miles by water from Massowah, and about ten across the plains. These men are under the command of the Alimanaga or colonel; there are now very few, if any, Turkish soldiers, almost the whole of them having been sent back to Jeddah.

The Nyab of Arkeeko, who in the time of Bruce's journey to Abyssinia was quite a powerful prince, is now nothing else than a mere puppet under the power of the Governor of Massowah, who orders him about as an ordinary vassal; his jurisdiction extends over the Arab and Bedouin Arab population around the coast to the extent of 30 to 40 miles, and he at times marches his men up on the high table land in the direction of Bogos, which lies on the frontiers of Abyssinia, and levies a tax on the inhabitants; this tax is levied either by persuasion or by force. The low country is inhabited by Arabs and Bedouin Arabs, who live in miserable huts; most of these tribes have large herds of cattle and flocks of sheep on which they subsist.

The rainy season commences on the coast at the latter end of October or commencement of November. The rainy season in the interior begins about the end of February, or commencement of March; and from the end of April to the commencement of September and October the River Teccazee, which divides the Province of Tigré from Abyssinia Proper, is so swollen by the rains that it is impossible to be forded. The whole of the lowlands during the summer months are completely devoid of vegetation, the stunted shrubs and grass being completely burned up; in fact, neither are there leaves on the trees, nor is there a blade of grass to be seen; all the cattle are driven away from the coast up to the high country; even the mules will not survive the heat. The temperature on an average during the hot summer months runs from 115 to 120 in the shade. The island and all the coast around can be compared to nothing but a vast furnace, where there is nothing to enliven the eye, and where it is impossible to find rest either by day or night. The Abyssinians from the interior cannot live in this climate for any length of time during the continuation of this heat, and to give an idea of the climate, a horse that I bought from an Abyssinian just arrived from the interior survived the change for two months, and then gradually sunk under it. In fact, the climate here, without any exaggeration, is not adapted for any European constitution.

The rainy season commences on the coast, as I have mentioned before, in the latter end of August or commencement of September, and then commences a frightful succession of fevers throughout the whole native population on the coast till the rainy season has completely set in. To give an idea of this, my wife and self, during the one year we were resident on the coast, had a succession of fevers, one after the other; my wife was attacked eight times, myself five. The weakening effect these fevers have upon the system takes a long time to eradicate its evil effects. After the rains have completely set in the grass commences to spring again, the leaves appear on the trees, and nature seems once more to revive after this lengthened and severe drought; but the herbage which springs up at first contains some poisonous matter till it has grown a sufficient height, and I have known from five to ten mules to die in a night in the village from the effects of this poisonous food. At no time of the year are there any vegetables to be had on the island, with the exception of a few tomatoes and onions, which are imported there, and Europeans are, in consequence, attacked by a running sore, which is somewhat similar to the dead-mark of Bagdad. Neither the French nor Austrian governments have had any representatives on the island for the last year or two, and during the year I was resident on the coast only one French man-of-war touched at the island.

The French, during the time I was resident at Massowah, purchased a place situated between Leila and the Babelmandel coast, by name Obokt, from the Dunkalie Chiec, for which they gave 10,000 dollars. The Chiec of the village, after receiving the money, disappeared, and his successor did not countenance the claim, or right of the French to purchase this site of land, nor of the Chiec to dispose of it, and the few huts that were erected by the French on that coast whilst occupied in surveying, after their departure were thrown into the sea by the natives. I need hardly mention that there is a good roadstead for ships, and also good water here, as most likely your lordship must have seen Captain Dayman's (of her Majesty's ship *Hornet*) account, who called there some years since to take soundings. But the place is devoid of vegetation, and if the natives were to turn restive, great difficulty would be found in obtaining food by the settlers, for at least some little time, until a certain amount of dread was thrown on the natives by troops that would have to be brought there for that purpose. No Romish priests, either French or Italian, are now tolerated in the interior of the country of Abyssinia; there are a few on the frontier, in the neighbourhood of Bogos, and also on the island of Massowah. There is very little trade done between Massowah and Suakin; most of the traders from Kartoum send their caravans to Suakin in lieu of Massowah; on one account owing to the distance being less and the route more convenient, and again because they are able to obtain a better market for their goods.

Before concluding, I may mention that the population of Massowah does not consist of more than one thousand, mostly Arabs, and a very few Turks. It is not fortified in any way; there are one or two rusty old cannons lying on the beach, but dangerous to be used; in fact, the last time they were brought into requisition, on the arrival of the Duke of Saxe-Coburg, they were found extremely deficient, and I may say almost useless, owing to the neglected state in which they had been allowed to remain for years. During the time of the large caravan, which is in the months of September and October, the Abyssinian merchants and their followers live on the island. They are all armed with lances and knives. They hate most fiercely their Mahomedan entertainers. The few troops

of the Kaimakan are quartered at Akeibro, on the main land. The Abyssinians feel that Massowah, the only port there is for their goods, is in the hands of the Infidels, and the Christian and Mahomedan hatred runs so high that the Abyssinians will not eat anything that has been killed by the Mahomedan, nor, *vice versa*, the Mahomedans the meat that has been killed by the Christians.

The slave trade is carried on in Abyssinia by the Mahomedan population, though the king does not sanction it himself, and droves of from 30 to 40 men, women, and children are brought down to the coast, and secreted in Arab villages round Massowah, and, under cover of night, put in small boats and dropped down by the tide to the larger crafts that are waiting a little distance below the island. They are then immediately put on board, and are taken across to Jeddah, Mocha, or Addeio, where they are kept till a fair price is obtained. In Massowah slaves are sold secretly, the Pacha pretending not to sanction it; in Jeddah, in the public market. As I have mentioned before, small quantities of cotton are brought down from the interior. I may observe, before concluding, that the country of Abyssinia is extremely endowed for the cultivation of this article, and large quantities most likely would be cultivated for exportation but for the uncertain and disturbed state the country is always in; and until some settled government be established, it would be useless to do anything with a view to the extension of the growth of this staple source of wealth.

Abyssinia, June 5th, 1863.

BRITISH ASSOCIATION, NEWCASTLE-ON-TYNE, 1863.

AUSTRIAN GUN COTTON.

A Committee, formed partly of members of the Mechanical Section, and partly of members of the Chemical Section of the Association, was appointed last year, to inquire into and report on Austrian Gun-Cotton.

Dr. GLADSTONE read the chemical portion of the report. Since the invention of gun-cotton by Prof. Schonbein, the thoughts of many have been directed to its application to warlike purposes. Many trials and experiments have been made, especially by the French; but such serious difficulties presented themselves that the idea seemed abandoned in every country but one, Austria. From time to time accounts reached England of its partial adoption in the Austrian service, though no explanation was afforded of the mode in which the difficulties had been overcome, or the extent to which the attempts had been successful. The Committee, however, have been put in possession of the fullest information from two sources—Prof. Abel, chemist to the War Department, and Baron W. von Lenk, Major-General in the Austrian Artillery, the inventor of the system. Prof. Abel, by permission of the authorities, communicated to the Committee the information given by the Austrian Government to our Government, and also the results of his own elaborate experiments. General von Lenk, on the invitation of the Committee, by permission of the Austrian Government, paid a visit to this country, to give every information in his power on the subject, and brought over drawings and samples from the Imperial factory. The following is a summary of the more important points:—As to the chemical nature of the material, Von Lenk's gun-cotton differs from the gun-cotton generally made, in its complete conversion into a uniform chemical compound. It is well-known to chemists that, when cotton is treated with mixtures of strong nitric and sulphuric acids, compounds may be obtained varying considerably in composition, though they all contain elements of the nitric acid and are all explosive. The most complete combination (or product of substitution) is that described by M. Hadon as $C_{36}\ H_{21}\ (9\ NO_4)\ O_{30}$, which is identical with that termed by the Austrian chemists Trinitrocellulose, $C_{12}\ H_7\ (3\ NO_4)\ O_{10}$. This is of no use whatever for the making of collodion; but it is Von Lenk's gun-cotton, and he secures its production by several precautions, of which the most important are the cleansing and perfect desiccation of the cotton as a preliminary to its immersion in the acids,—the employment of the strongest acids attainable in commerce,—the steeping of the cotton in a fresh strong mixture of the acids after its first immersion and consequent imperfect conversion into gun-cotton,—the continuance of this steeping for forty-eight hours. Equally necessary is the thorough purification of the gun-cotton so produced from every trace of free acid. This is secured exclusively by its being washed in a stream of water for several weeks. These prolonged processes are absolutely necessary. It seems mainly from the want of these precautions that the French were not successful. From the evidence before the Committee it appears that this nitro compound, when thoroughly free from acid, is not liable to some of the objections which have been urged against that compound usually experimented upon as gun-cotton. It seems to have a marked advantage in stability over all other forms of gun-cotton that have been proposed. It has been kept unaltered for fifteen years; it does not become ignited till raised to a temperature of 136° C. (277° Fahr.); it is but slightly hygroscopic, and when exploded in a confined space, is almost entirely free from ash. There is one part of the process not yet alluded to, and the value of which is more open to doubt—the treatment of the gun-cotton with a solution of the silicate of potash commonly called water-glass. Prof. Abel and the Austrian chemists think lightly of it; but Von Lenk considers that the amount of silica set free on the cotton by the carbonic acid of the atmosphere is really of service in retarding the combustion. He adds, that some of the gun-cotton made at the Imperial factory has not been silicated at all, and some imperfectly; but when the process has been thoroughly performed, he finds that the gun-cotton has increased permanently about 3 per cent. in weight. Much apprehension has been felt about the effect of the gases produced by the explosion of the gun-cotton upon those exposed to its action. It has been stated that both nitrous fumes and prussic acid are among those gases, and that the one would corrode the gun and the other poison the artilleryman. Now, though it is true that from some kinds of gun-cotton, or by some methods of decomposition, one or both of these gases may be produced, the results of the explosion of the Austrian gun-cotton without access of air are found by Karolys to contain neither of them, but to consist of nitrogen, carbonic acid, carbonic oxide, water, and a little hydrogen and light carburetted hydrogen. These are comparatively innocuous; and it is distinctly in evidence that, practically, the gun is less injured by repeated charges of gun-cotton than of gunpowder, and that the men in casemates suffer less from its fumes. It seems a disadvantage of this material, as compared with gunpowder, that it explodes at a temperature of 277° Fahr.; but against the greater liability to accidents from this cause may be set the almost impossibility of explosion during the process of manufacture, since the gun-cotton is always immersed in liquid, except in the final drying. Again, if it should be considered advisable at any time, it may be stored in water, and only dried in small quantities as required for use. The fact that gun-cotton is not injured by damp like gunpowder is, indeed, one of its recommendations, while a still more important chemical advantage which it possesses arises from its being perfectly resolved into gases on explosion, so that there is no smoke to obscure the sight of the soldier who is firing, or to point out his position to the enemy, and no residuum left in the gun, to be got rid of before another charge can be introduced.

Mr. J. SCOTT RUSSELL read the report on the mechanical portion of this question, by which it appears that greater effects are produced by gases generated from gun-cotton than by gases generated from gunpowder, and it was only after a long and careful examination that the Committee were able to reconcile this fact with the low

temperature at which the mechanical force is obtained. The great waste of force in gunpowder constitutes an important difference between it and gun-cotton, in which there is no waste. The waste in gunpowder is 68 per cent. of its own weight, and only 32 per cent. is useful. This 68 per cent. is not only waste in itself, but it wastes the power of the remaining 32 per cent. It wastes it mechanically, by using up a large portion of the mechanical force of the useful gases. The waste of gunpowder issues from the gun with much higher velocity than the projectile; and if it be remembered that in 100 lb. of useful gunpowder this is 68 lb., it will appear that 32 lb. of useful gunpowder gas is wasted in impelling a 68-lb. shot composed of the refuse of gunpowder itself. There is yet another peculiar feature of gun-cotton. It can be exploded in any quantity instantaneously. This was once considered a great fault; but it was only a fault when we were ignorant of the means to make that velocity anything we pleased. General von Lenk has discovered the means of giving gun-cotton any velocity of explosion that is required by merely the mechanical arrangements under which it is used. Gun-cotton in his hands has any speed of explosion, from 1 foot per second to 1 foot in $\frac{1}{1000}$ of a second, or to instantaneity. The instantaneous explosion of a large quantity of gun-cotton is made use of when it is required to produce destructive effects on the surrounding material. The slow combustion is made use of when it is required to produce manageable power, as in the case of gunnery. It is plain, therefore, that, if we can explode a large mass instantaneously, we get out of the gases so exploded the greatest possible power, because all the gas is generated before motion commences, and this is the condition of maximum effect. It is found that the condition necessary to produce instantaneous and complete explosion is the absolute perfection of closeness of the chamber containing the gun-cotton. The reason of it is, that the first ignited gases must penetrate the whole mass of the cotton, and this they do, and create a complete ignition throughout, only under pressure. This pressure need not be great. For example, a barrel of gun-cotton will produce little effect and very slow combustion when out of the barrel, but instantaneous and powerful explosion when shut up within it. On the other hand, if we desire gun-cotton to produce mechanical work, and not destruction of materials, we must provide for its slower combustion. It must be distributed and opened out mechanically, so as to occupy a larger space, and in this state it can be made to act even more slowly than gunpowder; and the exact limit for purposes of artillery General von Lenk has found by critical experiments. In general, it is found that the proportion of 11 lb. of gun-cotton, occupying 1 cubic foot of space, produces a greater force than gunpowder, of which from 50 to 60 lb. occupies the same space, and a force of the nature required for ordinary artillery. But each gun and each kind of projectile requires a certain density of cartridge. Practically, gun-cotton is most effective in guns when used as $\frac{1}{4}$ to $\frac{1}{3}$ weight of powder, and occupying a space of $1\frac{1}{10}$th of the length of the powder-cartridge. The mechanical structure of the cartridge is important as affecting its ignition. The cartridge is formed of a mechanical arrangement of spun cords, and the distribution of these, the place and manner of ignition, the form and proportion of the cartridge, all affect the time of complete ignition. It is by the complete mastery he has gained over all these minute points that General von Lenk is enabled to give to the action of gun-cotton on the projectile any law of force he pleases. Its cost of production is considerably less than that of gunpowder, the price of quantities which will produce equal effects being compared. Gun cotton is used for artillery in the form of a gun-cotton thread or spun yarn. In this simple form it will conduct combustion slowly in the open air, at a rate of not more than 1 foot per second. This thread is woven into a texture or circular web. These webs are made of various diameters, and it is out of these webs that common rifle cartridges are made, merely by cutting them into the proper lengths, and enclosing them in stiff cylinders of pasteboard, which form the cartridges. (In this shape its combustion in the open air takes place at a speed of 10 feet per second.) In these cylindrical webs it is also used to fill explosive shells, as it can be conveniently employed in this shape to pass in through the neck of the shell. Gun-cotton thread is spun into ropes in the usual way up to 2 inches diameter, hollow in the centre. This is the form used for blasting and mining purposes; it combines great density with speedy explosion. The gun cotton yarn is used directly to form cartridges for large guns by being wound round a bobbin so as to form a spindle like that used in spinning-mills. The bobbin is a hollow tube of paper or wood, the object of the wooden rod is to secure in all cases the necessary length of chamber in the gun required for the most effective explosion. The gun-cotton circular web is inclosed in close tubes of india-rubber cloth to form a match line, in which form it is most convenient, and travels with speed and certainty. In large quantities, for the explosion of mines, it is used in the form of rope, and in this form it is conveniently coiled in casks and stowed in boxes. As regards conveyance and storage of gun-cotton, it results from the foregoing facts that 1 lb. of gun-cotton produces an effect exceeding 3 lb. of gunpowder in artillery. This is a material advantage, whether it be carried by men, by horses, or by waggons. It may be placed in store, and preserved with great safety. The danger from explosion does not arise until it is confined. It may become damp and even perfectly wet without injury, and may be dried by mere exposure to the air. This is of great value in ships of war, and in case of fire, the magazine may be submerged without injury. As regards its practical use in artillery, it is easy to gather from the foregoing general facts how gun-cotton keeps the gun clean and requires less windage, and therefore performs much better in continuous firing. In gunpowder there is 68 per cent. of refuse, or the matter of fouling. In gun-cotton there is no residuum, and therefore no fouling. Experiments made by the Austrian Committee proved that 100 rounds could be fired with gun-cotton against 30 rounds of gunpowder. From the low temperature produced by gun-cotton the gun does not heat. Experiments showed that 100 rounds were fired with a 6-pounder in 34 minutes, and the gun was raised by gun-cotton to only 122° Fahrenheit, whilst 100 rounds with gunpowder took 100 minutes, and raised the temperature to such a degree that water was instantly evaporated. The firing with the gunpowder was therefore discontinued, but the rapid firing with the gun-cotton was continued up to 180 rounds without any inconvenience. The absence of fouling allows all the mechanism of a gun to have much more exactness than where allowance is made for fouling. The absence of smoke promotes rapid firing and exact aim. There are no poisonous gases, and the men suffer less inconvenience from firing in case-mates, under hatches, or in closed chambers. The fact of smaller recoil from a gun charged with gun-cotton is established by direct experiment; its value is $\frac{2}{3}$ of the recoil from gunpowder, projectile effect being equal. To understand this may not be easy. The waste of the solids of gunpowder accounts for one part of the saving, as in 100 lb. of gunpowder 68 lb. have to be projected in addition to the shot, and at a much higher speed. The remainder General von Lenk attributes to the different law of combustion. But the fact is established. The comparative advantages of gun-cotton and gunpowder for producing high velocities are shown in the following experiment with a Krupp's cast-steel gun, 6-pounder. With ordinary charge 30 oz. of powder produced 1,338 ft. per second. With charge of $13\frac{1}{2}$ oz., gun-cotton produced 1,563 ft. The comparative advantages in shortness of gun are shown in the following experiments, 12-pounder:—

	Calibres.	Charge.	Velocity, feet per sec.
Cotton, length	10	... 15·9 oz.	1,426
Powder, ,,	$13\frac{1}{2}$	... 49 (normal powder charge)	1,400
Cotton, ,,	9	... 17	1,402

As to advantage in weight of gun, the fact of the recoil being less in the ratio of 2 : 3 enables a less weight of gun to be employed, as well as a shorter gun, without the disadvantage to practice arising from the lightness of gun. As regards wear of gun, bronze and cast-iron guns have been fired 1,000 rounds without in the least affecting the endurance of the gun. As regards its practical application to destructive explosions of shells, it appears that from a difference in the law of expansion, arising probably from the pressure of water in intensely-heated steam, there is an extraordinary difference of result, namely, that the same shell is exploded by the same volume of gas into more than double the number of pieces. This is to be accounted for by the greater velocity of explosion when the gun-cotton is confined very closely in very small spaces. It is also a peculiarity that the stronger the shell the smaller the fragments into which it is broken. As regards mining uses, the fact that the action of gun-cotton is violent and rapid in exact proportion to the resistance it encounters, tells us the secret of its far higher efficacy in mining than gunpowder. The stronger the rock, the less gun-cotton, comparatively with gunpowder, is necessary for the effect; so much so, that while gun-cotton is stronger than gunpowder as 3 to 1 in artillery, it is stronger in the proportion of 6·274 to 1 in a strong and solid rock, weight for weight. It is the hollow-rope form which is used for blasting. Its power of splitting up the material is regulated exactly as wished. As regards military and submarine explosion, it is a well-known fact that a bag of gunpowder nailed on the gates of a city will blow them open. In this case gun-cotton would fail. A bag of gun-cotton exploded in the same way is powerless. If one ounce of gunpowder is exploded in scales, the balance is thrown down; with an equal force of gun-cotton nothing happens. To blow up the gates of a city, a very few pounds of gun-cotton, carried in the hand of a single man, will be sufficient, only he must know its nature. In a bag it is harmless; exploded in a box it will shatter the gates to atoms. Against the palisades of a fortification, a small square box containing 25lb. merely flung down close to it, will open a passage for troops; in actual experience, on palisades a foot diameter and 8 feet high, piled in the ground, backed by a second row 8 inches diameter, a box of 25lb. cut a clean opening 9 feet wide. To this three times the weight of gunpowder produced no effect whatever, except to blacken the piles. Against bridges, a strong bridge of oak, 24 feet span, was shattered to atoms by a small box of 25lb. laid on its centre; the bridge was not broken, it was shivered. As to its effects under water, in the case of two tiers of piles, in water 13 feet deep, 10 inches apart, with stones between them, a barrel of 100lb. of gun-cotton, placed 3 feet from the face, and 8 feet under water, made a clean sweep through a radius of 15 feet, and raised the water 200 feet. In Venice, a barrel of 400lb. placed near a sloop in 10 feet of water, at 18 feet distance, threw it in atoms to a height of 400 feet. All experiments made by the Austrian Artillery Committee were conducted on a grand scale—36 batteries, six and twelve pounders (gun-cotton), having been constructed, and practised with that material. The reports of the Austrian Commissioners are all based on trials with ordnance, from six pounders to 48 pounders, smooth bore and rifled cannon. The trials with small fire-arms have been comparatively few, and are not reported on. The trials for blasting and mining purposes were also made on a large scale by the Imperial Engineers' Committee, and several reports have been printed on the subject.

Sir Wm. G. Armstrong said it was impossible to listen to the report which had been read without being very much impressed with the great promise there was of gun-cotton becoming a substitute for gunpowder; but at the same time there were certain peculiar anomalies about it which he certainly should like to have cleared up, and until they were, they could not feel that perfect confidence in the results that they wished to do. In the first place with regard to the heat evolved, they were told that, with such a quantity of gun-cotton as would produce a given quantity of gas, a certain initial velocity was imparted to the projectile, and that the heating effect upon the gun was much less than when a similar velocity was produced by an equivalent quantity of gunpowder. The absence of heat in the gun implied an absence of heat in the gas. Where was the projectile force to come from, if there was no heat in the gas? He could not, for his part, conceive how it was possible of explanation. The next point that occurred to him was with regard to the recoil. It was stated that the recoil was very much less. That was ascribed to the absence of solid inert matter in the charge, which, in gun-cotton, was next to nothing. If the recoil was only two-thirds that of gunpowder, it would require, in order to account for that difference, a much larger quantity of solid matter than there really was in the case of gunpowder. The report stated that the use of gun-cotton enabled them to reduce the length of the gun. It was quite certain, however, that with a short gun they could not get an equal initial velocity as with a long gun. If the initial velocity were increased there was more danger of bursting the gun than with gunpowder. Because if they got any velocity, or an equal velocity with the shorter gun, it must be concluded that it was done by virtue of a greater initial pressure, and an earlier action upon the shot. That necessarily implied a greater strain upon the gun at the first explosion, and that would necessitate the employment of stronger guns. He should have expected a smaller velocity by a shorter gun, for the action of the gas was necessarily shorter than in a longer gun. The heat question, however, was to him the greatest puzzle of all. How they could have the propelling power without heat in the gas, and, if they heated the gas, how they escaped heating the gun, he could not understand.

Professor Pole said he was quite unable to give any explanation of the difference of recoil. If the shot left the gun with the same velocity as when fired with gunpowder, it was natural to suppose that there must be the same quantity of recoil.

Mr. Siemens having briefly spoken on the dynamical question involved in the matter, suggested that the greater heat imparted to the gun in the case of gunpowder might be owing to the greater amount of solid matter, which taking up the great heat of the gases under a pressure of some 400 atmospheres, imparted a portion of the same by radiation to the side of the gun, while in the case of gun-cotton gases only were produced, which could only impart heat to the gun by the slower process of conduction, and left a larger margin of heat to be developed in force by expansion.

Admiral Sir E. Belcher thought that the reason the gun was not heated by an explosion of gun-cotton might be because the gases had not time to heat the gun owing to the rapidity of the explosion, which was slower in the case of gunpowder; or that it might arise from the greater amount of fouling in the case of gunpowder.

Captain Maury said this report was something more than interesting, because it was so exceedingly suggestive, and it appeared to him that it afforded them an element of security by giving the preponderance on the side of defence. Ever since steam had been applied to purposes of naval warfare it had been considered a matter of very great doubt by many professional men how far ordinary steamers and men-of-war, where forts were to be passed at the mouth of a river, were capable of sustaining the fire of such forts and passing up the river. And to show that there was ample time for them to do so, they had only to recollect the fact of steamers having fought forts for several hours. In the Crimea and at Charleston the steamers had remained under fire for several hours—a much longer time than was necessary to enable them to pass the forts and go higher up the river into a place of safety where they could do damage to the enemy. Iron-clads had rendered this much more easy than it had previously been. If then their principal defences failed them at the

mouth of a river in this way, the question was whether they should not have recourse to mining for the destruction of the invading vessels? He himself had been engaged upon the subject. He found this difficulty in employing gunpowder, that in order to be sure of destroying the vessel as she passed in a given line by means of gunpowder, the magazines must be in actual contact, or very nearly in actual contact with the side of the vessel; otherwise the probability was that the vessel would not be destroyed. Last week they had the intelligence of a vessel having had a mine exploded under her on the James River. That magazine contained several thousands of pounds of powder. The vessel did not know that the mine was there; but the mine did not destroy the vessel. It merely threw up a column of water, which washed some of the men overboard. His own conclusion was, that to make sure of destroying a vessel after she had passed the forts, they must mine the channel in such a manner that the vessel must come in contact with one or other of the mines. It was found that wooden vessels to contain the powder would not do. They would not confine the powder long enough to produce a sufficient force. It was necessary to make them of stout boiler iron. It would not do to leave the magazines on the top of the water, and it would not do to put them at the bottom, for then there would be a cushion of water between the bottom of the ship to be destroyed and the magazine, which would protect the vessel. In short, they had to anchor them beneath the surface with short buoy-ropes, at a depth proportioned to the kind of vessel expected to come up. But when they made the magazine of boiler-iron they had to have buoys to float it so large that they were always in danger of being carried away by the vessels crossing the line of magazine. The plan was to place those magazines in a ring in such a position that the vessel in passing would have to come in contact with at least one and probably two of them. It was necessary to place those magazines of powder so that when you saw the vessel in that range you had only to bring the two poles of the galvanic battery together and make the explosion. There was, as already stated, a difficulty in using gunpowder. But since gun-cotton had the remarkable effect of destroying a vessel—he did not know her strength—at a distance of 18 feet, and that not vertically, but laterally, the question arose whether they might not fortify and protect those channel ways by placing a ring of gun-cotton magazines along the bottom; but, at any rate, if that was not necessary, they could float them at any depth, and out of reach of the vessels generally using the channel. That appeared to him to be one of the most important uses of gun-cotton, and it was one which would give safety to cities which were some distance from the mouths of navigable rivers. He trusted that in the event of the Committee continuing their labours, they would address their attention to this important point.

Admiral Sir E. Belcher stated that the explosion of gunpowder under water was once done under one of his own vessels to clear away ice. He placed it upon the ground, thinking that its explosion would blow the ice clear of her bows without touching the vessel. There was, however, sufficient water to form a cushion, and when the explosion took place it only produced a great wave upon which the vessel rose.

Professor Pole said what they wanted was something to show the varying pressure of the gases in the gun; in fact, an indicator diagram.

Mr. J. Scott Russell set himself to clear away the many difficulties which attended this very difficult subject. How was it that in gunpowder and in gun-cotton where there were equal quantities of gas put in, the gas in the case of gunpowder was raised to an enormously high temperature, and came out at an enormously high pressure, showing that they had gas enormously expanded by heat; whereas in the case of gun-cotton the gas came out quite cool, so that you might put your hand upon it, and the gun itself was quite cool? He (Mr. Russell) had a theory. Steam was a gas, and steam expanded just by the same laws as other gases did. A great deal of the gas of gun-cotton happened to be steam. Let them conceive 100 lb. of gun-cotton shut up in a chamber that just held it. They had got there all the gases that had been spoken of, but they had also got about 25 lb. of solid water—about one-third of a cubic foot of water—in that chamber. What did they do with it? They put fuel, they put fire to it. They heated the whole remaining pounds of patent fuel. If, then, they considered the gun-cotton gun as the steam-gun, they got rid of two difficulties. They would have, first, the enormous elasticity of steam; and secondly, they would get the coolness of it. They all knew that if they put their hand to expanded high pressure steam, it had swallowed up all the heat and came out quite cool. He believed that the gun-cotton gun was neither more nor less than Perkins's old steam-gun with only this difference, that you bottled up the fuel and water, and let them fight it out with each other. They did their work and came out quite cool. He hoped, however, that it was understood that he did not dogmatize. He put all he had said with a note of interrogation upon it.

Professor Tyndall said he thought that a note of interrogation ought to be put to what Mr. Russell had said.

Capt. Galton, presuming there were yet many points that required further investigation, moved that a proposal be submitted to the Committee of Recommendations, that the Committee be requested to continue their labours for another year. He was sure the War Office would be glad to assist as much in the inquiry as they had hitherto done.

The subject was considered of so much importance that the British Association, though it has re-appointed the Joint-Committee to continue its inquiries, has passed a resolution to urge on the Government the appointment of a Commission by means of which a more complete investigation, and such as the subject unquestionably deserves, may be made than the means at the disposal of the Association will admit of.

New Method of Working Railways by Stationary Engines.

The following paper, by Messrs. R. and W. Hawthorn, was read in Section G:—

The paper brought before this section to-day is a description of a method of working a certain class of railways by means of ropes from stationary engines.

A system of working railways by fixed engines and ropes has long been in use on the colliery railways around Newcastle-upon-Tyne, as well as in other districts, and a plan for the same was made the subject of a patent by Mr. Benjamin Thompson, then of Ayton Cottage, in the county of Durham, and was introduced on one or two colliery railways. It consisted of a succession of fixed engines at certain intervals from one end of the line to the other, each engine being employed to work a portion of the railway in the following manner.

The engine gave motion to two rope rolls, and the rope from one of those rolls was attached to one end, and the rope from the other roll was attached to the other end of the train. Whilst one of the rope rolls was disengaged from the engine, and allowed to run loose, the other was in gear, and the rope from it was passed along the line, and round a loop sheave, then brought back and attached to the train. The engine being put in motion the train was dragged to the furthest end of the section worked by that engine, at the same time unwinding the rope from the loose roll, and taking it with it to be afterwards employed to drag back the returning train. This was continued throughout the line, each successive engine taking up the train and carrying it over a section of the line. This method was not a satisfactory one for the conveyance of passengers, as the rider or guide in charge had not sufficient control over the movements of the train, and there is an objection to the carriages being attached directly to

the rope, and at such a distance from the motive power. Ropes have been, and are yet, applied in other ways, for instance, on gravitating or descending planes, down which a loaded train passes, having the rope attached to the after-end, round a sheave at the top of the incline, and thence down to the ascending train, and thus the descending loaded train draws up the ascending light train; or, where the load has to ascend, a fixed engine is employed to draw it up, and the descending train takes the rope down with it. Ropes are also applied in a variety of ways to the working of incline planes on passenger railways. Thus there is nothing new in the use of stationary engines and ropes for working railway traffic. It will be observed that in all the cases referred to the rope is attached directly to the carriages.

In the proposed plan now offered to the notice of members of the Association the means of communicating motion to the train give greater security, as well as the advantage of avoiding the necessity of attaching a train to the end of a rope, thus ensuring to the guard as complete control over the movements of the train as he now has in the employment of the locomotive engine. In the new system it may be stated without exaggeration that the rope drives the locomotive wheels, and each carriage carries its own railway.

It is proposed with the ordinary construction and gauge of railway to place in the intermediate space between a double line of rails a series of double grooved sheaves fixed in spindles or axles which pass across under the rails extending a little over the centre of each line; a plain wheel or roller is fixed upon each end of these axles, by which the motion is communicated to the train from a stationary engine or engines placed at a convenient point of the line —by means of an endless wire or rope passing alternately over and under the grooved sheaves to the extremity of a section of the line where it is taken round a large loop sheave, and returned to the engine now passing over each sheave which it before passed under, and *vice versâ*, the double groove providing for the rope crossing itself without contact.

Having traversed twice along the line of sheaves the rope goes again on to the large winding sheave of the engine, on which a sufficient number of turns are taken to ensure the requisite friction.

From this arrangement of the rope on the sheaves, it will be seen that every alternate sheave runs in the same direction, and every intermediate sheave in the contrary direction; and this motion is communicated to the traction wheels or rollers before mentioned.

It is proposed to construct the carriages for passenger-lines on the principle of those used in America and on the Canadian railways, of a length of from 60 to 75 feet, and supported on bogies, and capable of seating from 120 to 150 passengers, each carriage to be fitted with traction bars—these bars extending over two or more alternate traction rollers—and to be furnished with the ordinary flanged wheels for running on the rails. The traction bars, of which there are two, are placed side by side, at such a distance from each other as may be necessary to meet the requirements of the line; and these traction bars are worked either in connection with or independent of each other by a suitable arrangement of levers or other gearing, by which either of the bars can be raised or depressed, thereby bringing a portion of the weight of the carriages upon the traction wheels or rollers, thus giving motion to the train of carriages in either direction. Or both these bars can be raised out of contact with the traction wheels or rollers, and the train left free from all tractive force.

The traction bars will be nearly the full length of the carriage, and the traction rollers will be placed about 18 feet apart, or at the rate of 293 per mile.

The carriage made in this way is adapted for running with either end first, being provided at each end with a platform on which the driver stands to work the traction bars; and it is considered that for ordinary traffic one carriage will be sufficient to form a train, but two or more may be attached to each other, or the number of trains of a single carriage each may be increased to meet the requirements of the traffic.

The motion of the train can be quickly and certainly retarded or stopped by raising one bar and depressing the other, in the manner of a brake, thereby reversing the direction of the driving motion.

A separate or independent traction carriage may be used, fitted with the traction bars and gear; but it is considered that such an arrangement would, in most cases, only be adding a useless and unnecessary weight to the useful portion of the train.

The present line of underground railway through London, from Paddington to Farringdon-street, is favourable to the use of the locomotive engine, where so much of the surface of the ground under which it passes is unoccupied by buildings, and readily admits of a good deal of open cutting and ventilation at the stations, which cannot be the case where the railway passes under the densely-populated parts of a city, as those projected in London must do. In such cases it will be necessary to provide for working in a continuous tunnel of perhaps three or four miles in length, in which the steam and smoke of locomotive engines would prove obnoxious to a much greater extent than is experienced on the present line, which is only partially an underground railway. As there does not appear to be any means of remedying these evils, except at a very extravagant cost, it is believed that the new system may be introduced with advantage in such cases as are above referred to, viz., railways passing under large towns or in situations where opportunities do not occur of having openings to the surface.

The maintenance of the engines will be considerably less than with locomotives, to balance the expense of keeping in working order the sheaves, ropes, &c., which will cost more than an ordinary line.

Both calculation and experiment on the adhesion required to propel a train remove any reasonable doubt of being able, by the new system, to obtain sufficient tractive force by the tractive bars and rollers, and it is evidently quite feasible to increase this tractive force if required.

With a locomotive a train of 15 or 20 carriages has to be drawn by an intense pressure on six or eight points, and it is this which adds such a heavy item to the cost of railway maintenance. This disadvantage will be, to a great extent, remedied by the proposed system, the tractive force being more distributed, and consequently the wear and tear diminished. Finally, if such a system as the one proposed can be introduced free from the objections that have hitherto been considered inseparable from the use of ropes, it will greatly facilitate the construction and extension of underground railways without their present drawbacks.

PALSER'S IMPROVED MACHINERY FOR PAPER-MAKING AND RECOVERING THE ALKALI.

The object of this invention is to reduce straw or similar material to pulp in an economical and expeditious manner by means of two cylindrical boilers rotating above a reverberatory furnace. Above these boilers are vats, brought into communication with the boilers by arrangement of suitable piping—the boilers for receiving the material to be operated upon, and the vats the liquor which has been used in the treatment of the fibrous materials. The bottoms of the vats are pierced with holes (capable of being closed as required), through which the liquid is allowed to drip and flow over the rotary boilers. Within the wall separating the two boilers is an arrangement for warming air and water respectively, for filling the boiler and accelerating the evaporation in the vats. The pipes in the boiler for discharging the liquor are separated from the stock in the boiler by perforated partitions, and can neither

be broken nor bent by the pressure of the revolving stuff, or closed by solid matters accidentally forced into them.

In operating upon straw especially it is first cut into suitable lengths, winnowed to cleanse it from dirt, and crushed between rollers to make it ready for boiling. The boiler is then filled with the material, the necessary quantity of liquid run into it, and fire-heat and steam diverted to it from the adjacent boiler until the temperature and pressure are equal in both. This operation is important as the means of raising the temperature of the one boiler, while the cooling of the other is facilitated and the alkaline-charged steam made use of. The steam remaining in the boiler to be cooled is caused to force up the exhausted liquor into the vat above the boiler, which is afterwards discharged upon the surface of the boiler below, when a rapid evaporation of the liquid is produced, and its change into a viscous state effected. The material in the boiler is then washed, by being placed in a tub with a false bottom, by letting in water below which an increased degree of agitation is obtained, and consequently more effectual washing. The stuff is afterwards treated in the usual way.

SALT AS A MANURE.

Mr. Fras. Mewburn, Larchfield, Darlington, has addresed a circular to the farmers in the county of Durham, and in Cleveland, informing them that the Liverpool Chamber of Commerce employed Dr. Phipson to report on salt as a manure, and the following were his conclusions:—"1. That without a due proportion of salt, plants cannot attain their proper degree of perfection; and this applies especially to colza, turnips, swedes, beet, spinach, wheat, oats, maize, and other grasses. 2. That salt is an essential constituent of plants as well as animals. 3. That the soil is constantly losing, by cultivation, a great amount of salt, taken away by the crops. 4. That none of the manures at present used (except a very few of the best superphosphates) contain any salt; even guano shows only four-tenths per cent. 5. That it is necessary to add salt at regular intervals to the soil, in some shape or other, if we wish to derive the greatest possible benefit by our crops. Mr. Mewburn believes that salt will be furnished in great abundance and cheap in the country of Durham and in Cleveland, and expresses a hope that the farmers in those districts will test the doctor's "conclusions" by extensively using salt in their tillage tand.

Home Correspondence.

HOMES OF CELEBRATED MEN, POSITIONS OF IMPORTANT ABBEYS, CASTLES, BATTLE-FIELDS, &c.

Sir,—It has already been stated to Mr. Ewart, that it has been proposed that the position of Sir Isaac Newton's home, where he lived and died, in Kensington, in 1727, might be marked on the ordnance maps of that part.* And in reference to Mr. Ewart's comprehensive idea of marking the homes of eminent men, the use of the ordnance maps was not only extended for that purpose, but to find the positions of abbeys, castles, battlefields, &c., &c.

What was suggested to Mr. Ewart was, that tracing cloth, of the size of ordnance sheets, should be divided into a number of squares, and that alphabetical explanatory indexes of reference should be prepared to point out in what part within any square the position sought for could be found.

I have now an ordnance sheet, 23 by 29 inches nearly, before me. This of course cannot be divided into squares, but it may be into parallelograms of the same proportion, and if ordnance sheets were thus divided by faint, or, better still, coloured lines, that would give great facility for identifying nearly the position of any place sought for.

Then if, of the size of one of these divisions, a transparent glass, mounted, and divided into any convenient number of smaller divisions, be placed thereon, the position of any place sought for could instantaneously be more closely approximated, if not identically found, by the index properly prepared.

Tourists would find such guides of vast service in their botanical, geological, or other research for matter worthy of their attention or investigation. Of course with transparent cloth, divided as the sheets of ordnance maps, and placed thereon, the glass guide could with equal facility be used.

These suggestions for extending the use of ordnance maps for education are submitted for consideration and further improvement.

I am, &c.,
JOSEPH JOPLING.

6, Vassall-terrace, Kensington, W.

* See the *Leisure Hour*, 13th September, 1862, page 584.

Proceedings of Institutions.

Glasgow Mechanics' Institution.—The fortieth annual report says, that although the past year has been one of great depression of trade, the classes as a whole have been well attended. In their report of last year, the directors intimated that day classes were to be commenced forthwith; and they feel gratified in being able to state that these have been most successful. The course of lectures on chemistry was this session entirely occupied with the systematic study of organic chemistry, including the acids, alkaloids, radicals, alcohols, hydro-carbons, colouring matters, &c. Several lectures were devoted to the elucidation of the principles of chemistry as applicable specially to the organic department of the science—the new notation was illustrated, and the modern classification of organic compounds was explained. Dr. Wallace, the teacher, expresses himself highly pleased with the strict attention of the class, and with the result of the Examination. In the Natural Philosophy Class, principally with the view of preparing students for the Society of Arts Examination, the subjects taken up by the lecturer (Dr. Johnston) were the principles of electricity, magnetism, and heat. The junior classes in the music department have made marked progress; at the end of the session they are, generally speaking, qualified to sing simple music at first sight. Commencing with the rudiments of the science, they proceeded through a course of the theory, qualifying them for the study of harmony and thorough bass. The advanced class had for text-books a work on thorough bass, by Mr. John Hullah, and a small work on the theory and practice of harmony, written expressly for advanced classes, in the study of which a creditable amount of knowledge has been acquired. Of the conduct and attendance of both classes, the teacher (Mr. Barr) speaks in the highest terms. The Animal Physiology Class was conducted in a similar method to that of last year. By means of oral examinations the lecturer (Dr. Leishman) took an opportunity, from time to time, of ascertaining whether the subject was understood, and always with satisfactory results. The Elocution Class has been made thoroughly conversant with the rules of oratorical speaking, and although (from a desire to lay a good and solid foundation) the class did not arrive at the delivery of set speeches and orations, yet there were very few (out of 80 or 90 students composing the class) who were not reported by the teacher as able to read with perfect rhetorical propriety any book which might be put before them. The Mechanical Drawing Class, under Mr. Peter Stewart, consisting principally of engineers and persons connected with other mechanical professions, has had a

very prosperous session; the number of tickets sold being considerably in excess of last year. The lessons, as usual, comprised plans, sections, and details of a great variety of machinery, arranged so as to suit the capacity of the students and the particular branches of the profession they are connected with. In the early part of the session the subjects under consideration were — geometry in its practical applications; the various curves used in the arts; projections and descriptive geometry. In the latter part of the session the more important details of the steam-engine and applied mechanics were considered, and illustrated largely by diagrams and models from the museum of the Institution. Mr. Stewart also, on two extra evenings, gave an account of what he saw in the machinery and engineering departments of the International Exhibition. The junior students in the Drawing, Painting, and Architecture Class, were, as formerly, instructed by Mr. A. D. Robertson, in the drawing of simple elementary forms, and progressively introduced to more advanced and complex figures requiring a knowledge of the general principles of perspective, which was carefully imparted to them. The advanced students were separated into classes for the study of ornament, figure, flowers, landscape, and architecture, each one making choice of that division of study which seemed most conducive to his future prospects. In the Architectural Class, the students went through a short course of practical geometry, in which they obtained a knowledge of the construction of scales, and, while studying the best examples of classic and gothic periods, had the varied features of each style fully explained to them, as well as the different modes of projection employed in perspective and working drawings. In the English Grammar, Composition, and Literature Class (teacher, Mr. R. B. Smith), the course of study during the session has embraced systematic instruction in English grammar, composition, language, and literature. The text books used were—"Angus's Handbook of the English Tongue," and "Milton's Paradise Lost," books I. to IV. The former work formed the basis of the lessons in grammar, composition, and language; the latter was read, the classical and other references explained, the style examined, and many portions of it parsed, analysed, and paraphrased. Home exercises were prescribed in letter, theme, and essay writing. In literature the master gave short occasional instructions on the English authors and their works. In the French class under Monsieur Dutoit, grammar, theoretical and practical, readings in prose and verse, idioms, conversation and composition, form the regular course. The German classes of the past session, under Herr Rehbann, consisted of the junior and advanced classes, which were respectively engaged with Dr. Ahn's grammar, Ollendorf's more advanced exercises, and Schiller's Wallenstein, varied by conversation and composition. The students amount to 66. During the present session the studies of the Spanish classes, under Mr. T. Henderson, have embraced the method of Ollendorf, and commercial and literary correspondence, and conversation. In the Latin and Greek Class, under Mr. Alexander Ramsay, A.M., the object of most of the students has been to prepare for the University, and their studies have been directed accordingly. The success of the classes is fully shown by the number of enrolments, which have this session reached to upwards of 110, being considerably more than double those of last year. In the Arithmetic and Mathematics Class, under Mr. H. M. Ashcroft, the business of the session was commenced with a series of lessons on logic, with a view to facilitate the study of geometry. The students were next made acquainted with such algebraical processes and symbols as enabled them to understand and appreciate the scientific investigations of the principles of arithmetic. During the course of the session, the higher rules of arithmetic were studied, also elementary algebra. The first three books of Euclid, and the fifth and sixth books, were carefully gone over. Dr. Thomson's tract on trigonometry was read, and the nature and use of logarithms learned. The Writing, Arithmetic, and Book-keeping Class was carried on by Mr. John Macgregor. The Mutual Instruction Class continues to hold an important position in connection with the Institution. There are 65 names on the roll, with an average weekly attendance during the session of 40. The business of the association consists, principally, in the reading of essays and discussions on subjects of general interest. The MS. Magazine, which was commenced in April, 1862, is now issued fortnightly. The course of lectures on geology has been resumed, and is progressing satisfactorily, under the superintendence of Mr. Thomas Struthers. There is to be a course of lectures on botany, conducted by Mr. Keddie. The library now consists of above 6,700 volumes, a large addition of valuable works in the various departments of literature, science, and art, having been made during the past year. Besides the students attending the classes, the library is open to the public at the annual charge of 5s. Considerable additions have recently been made to the museum, the accommodation of which is now largely extended. The "Middle Class School," established under the auspices of the directors, was open on the 1st August last year. Being a new undertaking in an untried field, some fears could not but be entertained respecting it; and, at most, great success was not looked for during the first year. It is, therefore, a matter of great pleasure to be able to report that the school has already met with marked prosperity: the number of pupils that have been enrolled in the various classes during the first session is close upon 200. The school is conducted on the same principles as the higher academies, and affords to the middle classes all the advantages of these institutions at lower fees. The several departments are under the care of separate masters, of tried efficiency. The girls and boys are, except in the junior department, taught in separate classes, and in the higher English classes at different hours. All the classes enjoy the instructions of the head-masters of the departments daily; and, in the case of the higher classes, each class is under the care of a separate master during the whole of its time in school. In the English department, which consists of three divisions—junior, senior girls, and senior boys—there are classes of all stages of advancement, from the alphabet to an advanced class for young men about to enter business, and a senior class for young girls for the study of grammar, composition, syntactical and logical analysis, and literature. In these classes 154 pupils have been enrolled. In the commercial department, there are classes at different stages in writing and arithmetic, and some pupils studying book-keeping, mensuration, algebra, and geometry. 111 pupils have been enrolled in this department. In the Latin class, seven pupils have been entered; in the French, sixteen; in the pianoforte, twenty-one; and in needlework, seventeen. Some pupils attended only one class, but three-fourths of the whole number attended two; many were members of three, and some of four or five. Altogether 191 scholars have been entered on the roll, including nearly an equal proportion of boys and misses. The abstract of income and expenditure shows that the receipts have been £1,332 19s. 8½d. and that there is a balance of upwards of £200 in hand.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, September* 18*th*, 1863.]

Dated 8*th May*, 1863.

1158. C. F. Bielefeld, Gower-street—Imp. in the manufacture of sheets, slabs, and other articles where fibrous materials are employed.

Dated 14*th August*, 1863.

2007. A. E. Brae, Leeds—Improved means of conducting electric currents through railway trains, and of actuating signals or alarums therein.

Dated 15th August, 1863.

2023. E. Scott, Manchester—Certain imp. in apparatus for governing or regulating the speed of engines. (A com.)

Dated 20th August, 1863.

2065. G. Spencer, 6, Cannon-street-west—Improved solutions to be used in the manufacture of paints and the preservation of wood, stone, and metallic surfaces, and in the preservation and waterproofing of fibrous materials generally, and for other purposes. (A com.)
2068. W. Hamilton, 45, Ship-street, Brighton—Imp. in the manufacture of spring mattresses.

Dated 21st August, 1863.

2076. T. F. Cashin, Sheffield—Improved means of communication between the passengers, guard, and driver of a railway train in motion.

Dated 25th August, 1863.

2101. W. E. Gedge, 11, Wellington-street, Strand—Imp. in machinery or apparatus to be used in the manufacture of candles. (A com.)

Dated 27th August, 1863.

2115. T. Bourne, New York, U.S.—Improved method of storing and holding petroleum and other oils, naphtha, and other products of distillation containing essential oils. (A com.)
2116. F. Pragst, Manchester—Certain imp. in steam engines, and in the mode of utilizing steam.
2117. J. Clark, Glasgow—Certain imp. in break blocks for railway and other carriages, and in the means of applying the same.

Dated 28th August, 1863.

2123. R. Bell, Glasgow—Imp. in measuring apparatus for looms.
2125. E. Vickers, Sheffield—Imp. in the manufacture of steel.
2129. C. Harratt, Hornsey-lane, Highgate—Imp. in apparatus for tilling land.

Dated 29th August, 1863.

2131. H. C. Pennell, Weybridge, Surrey—Imp. in the construction of skates.
2132. H. W. Putnam, New York, U.S.—Improved machine for wringing clothes.
2133. G. Lowry, Salford—Imp. in and applicable to cotton gins.
2135. W. Tingey, Manchester—Imp. in printing carpets, piled fabrics, druggets, and other similar articles.
2136. T. Williams, Manchester—Imp. in machinery or apparatus for steaming and opening cotton and other fibrous materials.
2139. A. Agnew, Welshpool, Montgomeryshire—Imp. in breech-loading fire arms.
2141. W. Weldon, 3, Falcon-court, Fleet-street—Imp. in apparatus for aerial navigation.
2143. J. Dodge, Manchester—Imp. in machinery or apparatus for grinding and polishing metallic articles.

Dated 31st August, 1863.

2147. F. A. Braendlin, Birmingham—Imp. in breech-loading fire-arms.
2149. B. L. Burnett, Teignmouth—Improved arrangements for removing the fuel from stoves or grates, and for facilitating the extinguishing of the fires used therein.
2153. J. Miles, Hastings—Imp. in traps for catching rats and mice, rabbits, and other animals and birds.
2155. M. J. Roberts, Brecon—Imp. in the arrangement or fitting of axles for railway and other carriages.

Dated 1st September, 1863.

2156. J. Snider, jun., Dorset-street—Imp. in breech-loading and other ordnance, part of which is applicable to the utilising of old smooth bore cannon, and in projectiles to be used therewith.
2157. C. Shorrock and W. Shorrock, Over Darwen, Lancashire—Certain imp. in looms for weaving.
2158. G. Russell, Glasgow—Imp. in apparatus for cooking, and for obtaining fresh water for use on shipboard and otherwise.
2159. W. Clark, 53, Chancery-lane—Imp. in hydraulic apparatus. (A com.)
2163. T. Erich, 77, Newgate-street—Imp. in machinery for pressing peat. (A com.)

Dated 3rd September, 1863.

2176. W. Boulton and J. Worthington, Burslem, Staffordshire—An improved method of making and inlaying encaustic tiles or other plastic articles and substances.
2178. W. Jolliffe, T. Jolliffe, W. Graham, and H. Taylor, Liverpool—Imp. applicable to paddle and other propelling wheels for navigable vessels.
2182. J. Loebl and I. Pick, Scott's-yard, Bush-lane—Imp. in fastening gloves.

Dated 4th September, 1863.

2186. T. Fisher, 7, Remington-street, City-road—Imp. in sprin balances where spiral springs are used.

Dated 5th September, 1863.

2188. G. Hargreaves, Shipley, Bradford—Imp. in steam boilers.
2190. W. Norton, Holley Bank, near Arva, Cavan—Imp. in laying and supporting submarine telegraph cables.
2194. R. Batt, Waterhouse Mill, Milnthorpe, Westmorland—Imp. in paper making machinery.
2196. G. B. Rennie, Holland-street, Blackfriars—Imp. in the construction of floating docks and pontoons, and the means of cleaning, painting, or repairing them.

Dated 7th September, 1863.

2200. H. Twelvetrees, Bromley, Middlesex—Imp. in portable mangling and wringing apparatus.
2202. S. Gerish, 60, Shoe-lane, Holborn, and J. Weston, 80, White-cross-street, St. Luke's—Imp. in machinery for morticing, drilling, dovetailing, and cutting wood, and in tools to be used for morticing.

Dated 8th September, 1863.

2204. J. H. Cutler, Birmingham—A new or improved dress fastening, which said fastening is also applicable to the fastening of bands and belts and to other like purposes.
2206. W. A. Wilson [illegible] J. Smith, Liverpool—Imp. in furnace fire-grates.
2210. W. Hewitt, B[illegible]tol—An improved rudder, and means of working the san[illegible].

Dated 9th September, 1863.

2216. T. Naden, jun., Birmingham—Imp. in raising the covers or lids of hot water jugs, tea-pots, coffee-pots, and other vessels.
2220. E. T. Hughes, 123, Chancery-lane—Imp. in the manufacture of chenille, and in the machinery or apparatus employed therein. (A com.)

Patents Sealed.

[*From Gazette, September 18th*, 1863.]

18th September.

735. E. Lever.
736. H. Wilde.
740. C. Webster and W. Forgie.
745. J. Nield and T. A. Nield.
746. R. A. Brooman.
750. C. Pryse and D. Kirkwood.
752. F. de Wyldé.
754. F. Roberts and A. Roberts.
756. G. A. Biddell.
757. E. Hartley, J. Clegg, T. Mellodew, and J. Mellodew.
758. J. M. Hetherington.
764. W. Johnston.
769. J. Reilly and W. Martin.
780. G. Stuart.
781. C. Monson.
782. R. Armitage and C. Senior.
785. R. A. Brooman.
787. L. Christofleau.
789. G. Cowdery.
792. W. Johnson.
801. J. Grantham.
802. W. M. Morgan.
804. J. Taylor, jun.
811. J. Leeming and R. S. Markindale.
816. J. Musgrave.
818. R. Mushet.
821. W. E. Newton.
839. W. Clark.
848. D. S. Sutherland.
884. J. Mosheimer.
905. G. Colomb.
952. A. V. Newton.
1010. W. E. Newton.
1040. A. Legras.
1064. W. Clark.
1223. W. Clark.
1262. J. Coignard.
1339. C. E. Laederich.
1616. W. Bradshaw and J. Bradshaw.
1619. G. Davies.
1693. W. Basford.
1788. A. Montleart and W. Tent.
1826. J. E. Vanner.
1844. G. Davies.
1862. W. Tranter.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, September 22nd*, 1863.]

14th September.

2243. J. Horsey.
2257. G. F. Smith.

15th September.

2249. S. Barnwell and A. Rollason.
2282. T. Greenwood.
2298. R. Mushet.
2326. J. Haworth.

16th September.

2260. W. E. Newton.
2262. W. E. Newton.
2295. T. Westhorp.

17th September.

2264. H. Stead and H. Gledhill.
2271. G. Owen.

18th September.

2290. V. H. Laurent.
2292. J. Cash and J. Cash, jun.
2306. H. E. Skinner and W. H. Miller.
2365. R. Mushet.

Patent on which the Stamp Duty of £100 has been paid.

[*From Gazette, September 22nd*, 1863.]

14th September.

2159. S. Chodzko.
2202. W. Young.
2204. J. Holman.

16th September.

2251. J. J. Russell & J. B. Howell.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4575	Sept. 14.	Child's Normal	Charles Smith Mary Shepherd	34, Union-street, Borough, E.C. 35, Surrey-street, Croydon, E.
4578	,, ,,	Button Gauge	George Philip Hill, of the firm of Sturgeon and Co.	121, Wood-street, Cheapside.

Journal of the Society of Arts.

FRIDAY, OCTOBER 2, 1863.

COUNCIL.

The following Institutions have been received into Union since the last announcement:—

Edinburgh, Philosophical Institution.
Northampton, Mechanics' Institution.
Southampton, Hartley Institution.
Witney, Natural History and Literary Society.

ART WORKMANSHIP PRIZES.

The Council beg to announce that seventy-two works, embracing nearly all the heads under which Prizes were offered, have been sent in for competition, but they have found it necessary to defer dealing with them for the present. The reasons are stated in the following circular, which has been forwarded to each competitor:—

Society for the Encouragement of Arts, Manufactures, and Commerce,
John-street, Adelphi, London, W.C., 1st October, 1863.

Dear Sir,—I am directed by the Council of this Society to inform you that they have found it necessary to defer, for the present, holding an exhibition of the works sent in to compete for the Art-Workmanship Prizes offered by the Society, as the very extensive repairs now going on in the Society's House render it impossible that the articles could be displayed in a suitable manner, and also because a large number of those who would be specially interested in seeing such works are absent from London at this season.

The Council regret this unavoidable delay, but they feel they would not be doing justice to those who have sent their works for competition, if they were to attempt an exhibition of them under these unfavourable circumstances. Whenever such an exhibition is in contemplation, due notice shall be sent to you.

I am, dear Sir, yours faithfully,
P. LE NEVE FOSTER, Secretary.

EMIGRATION TO NATAL.

By the Cape mail just arrived, letters and official reports have been received which indicate that satisfactory progress is making in the Colony of Natal.

The following are extracts from the Report of a Select Committee "to consider and report upon the best means of securing to this colony a larger immigration of agricultural and other settlers than the present system is adapted to create:"—

It appears that during the term ending 31st December, 1862, the white population of this colony increased from 7,829 to 13,990, being an addition of 6,361 during that period; 64,540 acres of land were also brought under cultivation, making an aggregate of about 70,000 acres in 1862, against 3,315 in 1853; the returns of stock of different kinds are also, for the same years respectively, 188,300 head against 307,647 head.

From these figures it is evident that the advance in production has been much greater in proportion than the advance in population, but the result has not been to render provisions cheaper; nor, however creditable to the European colonists—as a remarkable proof of their industry and enterprise—it may be, does it seem to the Committee a ratio of progress which ought to be accepted as sufficient to realise those expectations of future productiveness and prosperity which are based upon the proved and varied capabilities of our soil.

The Committee has compared statistics of the numerical, industrial, and commercial progress made by the principal British dependencies during the last ten years, and find conclusive evidence that other colonies, with perhaps fewer natural advantages, have attained a much higher degree of advancement than ours.

Since the cessation of the system known as "Byrne's Scheme," there has only been one system of immigration associated with this colony. This was the plan of assisted passages introduced about five years ago under the auspices of the Immigration Board, and continued up to the present time. Under this arrangement 1,291 individuals were brought into the colony, 978 of whom were proposed, and the proportion of their passage-money guaranteed, by friends here. The entire cost of conveying and landing these may be approximately stated at £20,731, of which £12,910 has been, or is to be, refunded, leaving a net outlay to be borne by the colony of £7,821. It appears, therefore, that the revenue has actually been taxed, on account of white immigration, to the extent of about £1,564 for each year during which the present system has been carried on.

As being directly connected with the subject of agricultural development, the question of Coolie immigration requires the incidental notice of the Committee. During the past five years 1,431 of these people have been landed and allotted here, at a gross outlay of £22,895. When, however, the whole of the guaranteed repayments are made, the actual cost to the colony of this most useful and reproductive movement will not have exceeded £7,000.

The Committee believe that while the present system of European immigration has worked satisfactorily in so far as its limited scope allows, it is insufficient to meet the requirements of the colony, and, unless very materially extended and improved, is not calculated to bring to this colony the number or the classes of population which are needed.

The persons who, under the present arrangements, are principally introduced, are those for whom provision already exists; whose arrival does not tend to meet the general necessities of the colony, and whose numbers must, to a great extent, be circumscribed.

When the results attained in other colonies by a more liberal expenditure and a more comprehensive policy than what are found here are compared with those realised in this colony, it becomes obvious that an enlarged system could, and ought to be, established here. The Committee find that during a period of seventeen years the Australian Colonies expended an aggregate sum of £2,726,541 in the introduction of 209,594 immigrants from Great Britain, being an average annual charge on the revenue of £160,384; while other colonies, in much less intervals, have increased their populations three, four, and five fold. In Natal, during ten years, the number of the whites has not been doubled, although no country can plead a more urgent necessity for a larger civilised population, nor can hold out a greater variety of geographical inducements.

The Committee would now refer to those classes of settlers that are more especially required here.

Passing by the question of labour supply for the coast districts, as not being directly within the range of the Committee's action, allusion may be incidentally made to the expediency of attempting to secure for Natal the labour derived elsewhere—from the North American States, in the shape of free negroes, and from the allocation of the negroes rescued in captured slavers. The only way of obtaining the last would be, the committee understand, by the establishment of a prize court at this port.

Labourers.—The Committee believe that, were proper arrangements for receiving applications established, it would be found that a very general demand for white farm

labour exists. There is reason to anticipate that a certain number of European shepherds will be required in the upland districts, and it is recommended that every magistrate be authorised to receive verbal or written applications for this class of labourers.

Mechanics.—Although it is obvious that the demand for labour of this description must be limited for a population of 15,000 whites, still, at this moment, there is a considerable demand for this kind of labour, and a demand large in proportion to the population; and that good wages will readily be obtained by good rough mechanics and handy men, for whom there is a far greater need in a country where buildings are so few and lodging is so dear, than in other and more populous countries, where employment is necessarily very much less than the supply.

It should be the business of an officer to collect reliable information as to local requirements for these and other classes—to receive applications from employers, and to keep the English agency regularly informed upon these matters.

As regards the general labour needs of the colony, it must not be forgotten that unless a sufficiency of artizan labour prevails here, an inadequate guarantee for the secure investment of capital is offered, the projects of enterprise are liable to be retarded, and the operations of incoming planters and agriculturists are discountenanced rather than encouraged. The Committee are aware that occasionally the want of employment for white workmen is urged by individuals—but they believe this want is, in most cases, more apparent than real—is generally owing to some exceptional cause, and that really efficient and sober mechanics, with moderate expectations, find little, if any, difficulty in obtaining occupation.

The immigrants which are most needed in this colony, as in most other new settlements, are those who devote themselves to the cultivation of the soil, or to the rearing of stock, and who are possessed, in a greater or less degree, of means. It is to those we must look for the development of those natural resources which are so abundantly possessed, but which, to a large extent, lie idle. There are various ways in which the Government can encourage the settlement and assist the efforts of this class.

1st.—By means of assisted passages.

2nd.—By the offer of land on advantageous terms.

3rd.—By facilitating the supply of labour.

4th.—By keeping open good lines of communication.

The first of these modes of assistance involves the expenditure of revenue, and before it could be held out in any special degree, a much larger amount will have to be annually devoted to immigration than has hitherto been granted. In the Australian colonies, from ten to thirty per cent. of the entire revenue is applied to this subject and to correlative purposes. In Natal the actual charge on the revenue for white immigration, during the past five years, has amounted to an average of five per cent., and at present barely amounts to three per cent.; the committee submits that this amount is out of proportion to the necessities of the colony in so important a respect.

It being now an admitted principle that in colonies requiring immigration, the revenue derived from land should be applied to that object, it is clear that the second mode of assistance bears directly upon the first.

The Committee regret that the extent of crown lands yet remaining unallotted, viz., 3,735,920 acres, are so situated, and of such a nature that any large revenue cannot be immediately anticipated from this legitimate source for appropriation to immigration purposes. They would, however, lay stress upon the importance of facilitating the occupation of these waste lands with a view to agriculture or stock-farming, and would recommend the adoption of any satisfactory proposal by which the crown lands would become available, either as a source of revenue or a means of production.

When it is remembered that other colonies are ably represented in the United Kingdom by resident agents having local experience, it is obvious that in course of time, as the tide of immigration increases, such an office will be required for this colony. Natal, at present, is solely dependent upon the action of the Land and Emigration Commissioners, who, though useful so far as they possibly can be, are, nevertheless, not possessed of that practical acquaintance with the peculiar circumstances and needs of the colony, and cannot feel that direct interest in its progress and welfare which can only result from long residence.

The subject of assisted juvenile immigration is well worthy of favourable consideration. The committee find, by the memorial of Mr. R. Clarence, that a charitable institution in London, of which Lord Shaftesbury is chairman, is anxious to send out a limited number of boys of good character, and possessing an elementary knowledge of some useful calling,—that three have already been sent, and have not only given satisfaction to their employers, but have written back expressing gratitude for what had been done for them; but that the association, although deeply desirous to see these boys settled in Natal, cannot afford to pay the cost of their passage out. As these boys are likely to make good and industrious colonists, and as the committee believe that the sooner in life an individual becomes accustomed to colonial circumstances, the better chance of success will he have, and the more useful member of society will he make, it is highly desirable that this proposal should be entertained. The committee must, at the same time, decidedly dissent from any proposition to send out boys from reformatory schools, or any class of immigrants of questionable character.

Another class of immigrants for whom employment, within certain limits, might be immediately obtained, is that of female servants, for whom a need confessedly exists. The committee are of opinion that many European families would be only too glad and grateful to guard their households from the contaminating influences too generally exerted by native nurses and servants, were English domestics obtainable. At present the supply of the latter is very insignificant and unsatisfactory, inasmuch as lengthened engagements are seldom practicable.

Were there an efficient organisation in London, through which arrangements might be made for the selection of applicants likely to give satisfaction, there can be no doubt that the expense of sending out a considerable number of English domestic servants would be guaranteed by employers here. With this view, the Immigration Board might be requested to communicate with philanthropic associations at home, so as to secure female servants of good character on the most advantageous terms.

Another subject of great practical importance is the reception of immigrants when they land, and their immediate accommodation. The committee are keenly sensible of the lasting influence left on the mind of a new arrival by first impressions, and they regard it as a matter of high consequence to encourage and aid, so far as may be, the immigrant at the commencement of his new career. They deem it a very useful and appropriate function of government to alleviate, wherever it is possible, the hardships incidental to all first colonial experiences; and they believe the erection of a suitable building, in which the poorer class of immigrants could obtain immediate lodging for a certain period after landing, would enable the immigrant to economise his resources, and would prevent undue disappointment at the time when it is most calculated to have an injurious effect.

The Committee has not overlooked the question of immigration from the operative classes of Lancashire. They admit that occupation might probably be found here for a certain number of our destitute fellow-countrymen, and they are aware that by other colonies large sums have been voted for the purpose of affording free passages to distressed operatives. The revenue of this colony will not admit an expenditure sufficient for an ap-

preciable immigration, and the Committee are not prepared to recommend any special appropriation for this object.

It is probable, however, that private individuals might feel disposed to guarantee the passage money of a limited number, and the present arrangements might be temporarily applied in furtherance of this object.

The Committee feel that while increased agricultural development is the great end to be obtained by every system of immigration, yet that the promotion of that end necessarily involves the encouragement of those other kinds of immigration to which reference has been made. While the evils which flow from a promiscuous, ill-regulated, and excessive rush of population, are clear and undoubted, and while every well-wisher of the colony will desire that it shall not be subjected to such evils, it is also equally clear that the colony requires, and could advantageously absorb, larger and more rapid accessions of agricultural and labouring settlers than it now receives. Unfortunately, two leading difficulties, to be encountered by every attempt to introduce a new system, are, the inadequacy both of revenue and of land; and these are almost insuperable obstacles in the way of any comprehensive proposal. It is only by a wise liberality in the expenditure of the one, and by a judicious discretion in the disposal of the other, that immigration can be materially assisted, and somewhat similar inducements held out in connection with Natal that are offered to intending settlers by other colonies.

The following resolutions have been moved and carried in the Legislative Council:—

1st. "That, in the opinion of the Council, the circumstances of the Colony require that a larger European immigration than exists at present should be actively promoted, but that the inducements offered, and assistance rendered, to immigration under present arrangements are not sufficient to meet the requirements of the Colony, and should be materially modified and extended."

2nd. "That, in the present position of the Colony, only three modes of immediately promoting an increased immigration present themselves, viz.,—a larger appropriation from the general revenue; a loan raised for the purpose; and the appropriation to this object of Crown Lands; and that, as the proposal of the Natal Land and Colonisation Company offers a desirable means of increasing the European population, by a well-regulated influx of suitable settlers, without other charge upon the colony than the alienation of a comparatively small portion of Crown Lands, and that, too, on highly advantageous terms, as set forth in the appendix to the Report of the Committee on European Immigration, this House is of opinion that negotiations should be re-opened with the Company on the modified basis recommended by the Immigration Board, and by the Select Committee."

3rd. "That a copy of the report of the Select Committee upon European immigration, with its appendix, together with a copy of these resolutions, be transmitted, by respectful address, to the Lieutenant-Governor, praying his Excellency that he forward the same to the Secretary of State for his information; that the recommendations with which the report concludes be acted on; and especially that action be immediately taken upon the following recommendations, viz.:—

"That at least fifty ordinary mechanics be brought out, if need be, at the expense of Government; and that the Natal Land and Colonisation Company be requested to undertake the procuring and selection of these on behalf of the Colony.

"That communication be opened with the Female Emigrant Association, or with the Colonial Emigration Society, with the view of introducing, under special arrangements, a certain number of female servants of good character.

"That a sum of £5,000 be placed upon a Supplemental Estimate for the years 1863-4, in addition to the amounts already voted, with the view of carrying out these and the other recommendations of the report."

OPENING OF THE NEW NATIONAL ART TRAINING SCHOOL AT SOUTH KENSINGTON.

The new buildings which will come into use on the 5th of October, are the first permanent buildings which have been provided for the National Art Training Schools. The buildings heretofore occupied by the Art Classes have all been of a temporary kind. In the first instance, in 1837, when the School of Design was instituted, the classes were held in rooms, on a second floor in Somerset House, once occupied by the Royal Academy; and now by the office for the registration of births, marriages, and deaths. Next the classes met in 1852 in Marlborough House, where the Queen, at the intervention of H.R.H. the Prince Consort, graciously permitted a training school for teachers for the Schools of Art throughout the country to be first established. Then in wooden buildings at South Kensington, to which place the training schools were removed in 1856.

The present buildings are plain brick, but of a substantial, fireproof character, and provide for all the special requirements of an Art School which the experience of a quarter of a century has shown to be necessary, in respect of lighting by day and night, as well as ventilation, heating, etc. A distinct series of rooms has been provided for male and female classes; those for males being on the second, and those for females on the first, story. In each series, separate rooms are assigned for drawing, painting, and modelling, &c., and there is a lecture-room in common for the male and female classes. The entrances to the respective classes are in the Exhibition-road. This series of buildings forms the north and west sides of the inner quadrangle of buildings, the plan of which was approved by the Select Committee of the House of Commons in 1860.

BRITISH ASSOCIATION, NEWCASTLE-UPON-TYNE, 1863.

On the Paper Manufactures of Northumberland and Durham. By W. H. Richardson.

In consequence of the general disinclination on the part of the paper manufacturers to furnish any information or statistics of their operations, this account will necessarily be imperfect.

The estimates given have, however, been carefully considered, and are as accurate as possible under the circumstances.

Number of firms in the trade	12
Number of machines making white paper...	10
" " " brown " ...	9
	Tons.
Quantity of white paper made per year ...	3,500
" brown " " " ...	4,500
Total	8,000

Being about one-twelfth of the entire production of the United Kingdom.

Total estimated annual value, £300,000.

	Tons.
Coarse material, as old ropes, &c., used for brown paper	5,200
Rags	4,000
Esparto grass	2,000
Bleaching powder	400
Soda ash	200
Coals	35,000

The imports of Esparto grass to the port of Newcastle-on-Tyne were:—

1860	1,224 tons.
1861	2,613 "
1862	9,534 "

The principal improvements that have been made in the manufacture of paper, in late years, are in the details and general efficiency of machinery, whereby a much

larger quantity of paper is made with the same apparatus than formerly; and in the superior management of the chemical processes, whereby material that formerly was entirely useless is now worked up into common shop papers, and inferior rags are cleansed and bleached into a good white paper, which formerly were made into coarse paper.

The only notable exception to this is the introduction of Esparto grass, the importation of which has been steadily increasing, and, as will be seen by the statistics already given, amounted to nearly 10,000 tons in the year 1862, into the port of Newcastle alone, the greater part of which was, however, forwarded by railway into Scotland, Lancashire, and elsewhere. Newcastle affords special and peculiar facilities for the importation of this material from the east coast of Spain, where it is principally gathered. Vessels load at Newcastle with coke or coals for Spain, and bring return cargoes of manganese, pyrites, copper ore, lead and lead ore, iron ore, and other minerals for the use of the chemical and other manufactures on the Tyne, and from the lightness of the Esparto grass, one ton of which occupies the space of three to four and a half tons measurement, they are enabled to carry a full cargo of it in addition to the minerals, which serve as ballast, thus materially economising the cost of freight; so much so, that paper manufacturers near Edinburgh and in Lancashire find it cheaper to import *viâ* Newcastle, than by way of Leith or Liverpool.

Esparto, or Alfa as it is called on the African Coast, is a coarse grass, which grows in sandy places in almost all the countries bordering on the Mediterranean. This grass consists mainly of *Ligeum Spartium*, *Stipa tenacissima*, and other species of the last named genus, all very similar in character and general appearance.

It has been used from time immemorial for making mats, ropes, &c., and is mentioned in Pliny's Natural History as applied to these purposes. Various attempts have been made to manufacture Esparto into paper during the last 30 years, one patent for the purpose being dated as far back as 1839, and in France similar efforts have been made for many years. None of these, however, have been practically successful on the large scale, with the exception of the process arranged by Mr. Thomas Routledge, of Eynsham Mills, in Oxfordshire, who has been making printing paper from Esparto for the last nine years, and has taken out three patents for the processes employed. He has lately taken a mill at Ford, near Sunderland, for making printing paper from Esparto only. Other manufacturers have, however, used it mainly as a blend with rag material.

No material alteration in the machinery or apparatus is required for working Esparto, and very much less power is required. The successful working of this fibre depends mainly on the careful and proper adjustment of the quantity and strength of the chemicals employed.

The quantity of soda ash required for neutralising the gummo-resinous matters contained in the fibre, so as to admit of its being made into a pulp, is very large, though not so great as is required for straw; and the fibre, unlike rags, never having before been subjected to bleaching or other chemical treatment, also requires very much more bleach powder to bring it to a colour suitable for printing paper. The quantities required are from five to six times as much as for cleansing and bleaching the coarsest rags.

The importations of Esparto into the United Kingdom for the past 12 months being about 18,000 tons, the use of this article may be estimated to have caused an increased consumption of soda ash and bleach powder of at least 4,000 tons per annum, and the fact of these chemicals being dear on the Continent of Europe, is one obstacle to the use of Esparto there.

Nearly all news paper, not excepting that on which the *Times* is printed, contains a portion of Esparto, and some of the penny daily papers published in Edinburgh contain only one-fourth rag material.

The large supply of paper making material from this source has been most opportune. Rags are becoming gradually scarcer; coloured rags suitable for making common printing paper were worth 4s. to 6s. per cwt. in 1848, and are now worth 9s. to 12s. per cwt., and this notwithstanding the relief produced by the importation of Esparto.

This scarcity, the existence of which the Jurors' Report of the Exhibition, 1862, most unaccountably denies, has been aggravated by the almost total cessation of the supply of waste and tares from the cotton mills, and even with the assistance of Esparto grass and cheaper chemicals and fuel, the paper makers in this country have been placed in a most disadvantageous position in respect of the supply of material in comparison with their continental rivals, by recent legislation, which in the opinion of many will have a tendency to cripple the progress of the trade in this country. The discussion of this subject is, however, not suited for the present occasion.

The greater part of the paper manufactured in this district is of the coarser descriptions, and Newcastle brown and Tyne casing, which, from a geographical error, is known in Manchester as Scotch paper, have a reputation throughout the kingdom for toughness and general excellence.

The printing and writing papers of Messrs. Annandale and Sons have a deservedly high reputation in the London market. The other descriptions of white paper made in the district are mainly for the daily newspapers, whose consumption of common printing paper has of late years become so enormous as materially to alleviate the depression consequent on the general dullness of trade arising from the cotton famine, and it is hoped, notwithstanding the unfairness with which the trade has been treated by the legislature, that, with the resumption of business in Lancashire, it may recover its former prosperity.

On Improvements in Machinery and Apparatus for Cleansing and Purifying Casks. By Robert Davison, C.E.

In the paper which the author had the honour of reading before this Association in the year 1849, on the "Desiccating Process," he took occasion to mention its application, amongst others, to the purifying of brewers' casks, and further stated that upwards of one million casks had at that time undergone the process. It was not, however, made clear that the casks had to undergo a previous operation, namely, that of cleansing, which was effected by machines of peculiar construction, completely removing all adhering matter from the inside without resorting to the expensive and injurious system of unheading.

The object of the present paper is not only to confirm all that was then stated as to the efficiency of the hot air system by stating that upwards of eleven millions of casks have since been treated in like manner, but to illustrate still further the importance of a proper system of cleansing casks before any purifying process is applied.

It may seem at first sight but an indifferent matter to bring before an important Association like the present, but when it is considered that there are no fewer than 2,400 public breweries in the United Kingdom who brew something like 20,000,000 barrels of beer annually, and assuming that at least an equal number of casks require to be cleansed, it becomes a matter of considerable importance how, and at what cost, this enormous amount of work is accomplished.

As regards the cleansing process, it is worthy of note that the first successful introduction of machinery for this purpose was in the year 1843, when the author, in concert with Mr. W. Lymington, produced the machine already referred to, as well as the improved mode of purifying.

Previous to this period, the only known method of cleansing was by the introduction of steam or hot water, or both, assisted by a chain placed inside, and a rolling

motion given to the cask by hand. By such means it will not be difficult to see how uncertain would be the internal state of the cask.

The machine invented in 1843 consisted of a double frame, suited to the form and size of each cask, the frames revolving one within the other, and at right angles to each other in such a manner as to cause a chain of peculiar construction, assisted by hot water, to traverse completely over every portion of the cask, and so effectually remove all adhering matter. These machines still continue to be held in high repute at many first-rate establishments, and so far as cleansing is concerned, they are nearly, if not quite, equal to anything which has since been attempted in this way. There is, however, one objection to them, namely, they are only calculated to cleanse one cask at a time, which, in such establishments as the two leading Burton houses (whose demand for casks each day amount to thousands), has been a complete bar to their introduction and use. The new machine now placed before the Association not only gets over the difficulty in respect to the number of casks cleansed at one time, but is superior to the old machine in point of speed generally. This machine consists mainly of two circular discs with an upright shaft or spindle in the centre, which has a screw at each end (the threads being cut right and left handed). The two discs have likewise each a corresponding female screw, which, when turned round on the upright spindle (the same being temporarily fixed), it will be easy to see, will cause the discs to advance or recede from each other, according as they are turned to the right or left hand. Such is the mode by which the casks are either secured or released from the machine, that is, by turning in one direction, the casks are effectually secured between the two discs; by turning the reverse way they are released.

Any number of casks which the bottom disc will contain, and even a second tier (if desired) can be fixed and afterwards cleansed at one operation—say two sets of 5 or 10 casks.

A compound motion is given to this machine not dissimilar (so far as the outer action is concerned) to the old machine, but, from the fact of the cask being placed in an upright position in the machine, and likewise surrounding the middle shaft or spindle, the casks themselves, when the machine is set in motion, are twirled about in a manner altogether peculiar and effective.

The best cleansing medium is found to be a small quantity of sharp shingle along with two or three gallons of hot water.

The time occupied in cleansing ordinary dirty casks is about 5 minutes, and very bad mouldy casks about 12 minutes. Thus it will be seen, that one of these machines is calculated to cleanse easily 100 ordinary dirty casks, or 60 mouldy ones per hour, at the mere expense of two or three labourers and an insignificant amount of engine power. In large establishments where unheading is still resorted to, the saving to be effected by this new machine must of necessity be great.

With regard to purifying both new and old casks, there can be no doubt that the wisest course for new casks is to divest the wood as much as possible of the coloured juices before it is made up into casks, which is easily done by hot water or steam, and it is afterwards dried by currents of hot air.

Old and tainted casks are found to be cured (within 1 in 200) by partial steaming, and afterwards by exposure to currents of hot air at 450 degrees Fahr.

Experience having sufficiently proved the soundness of this mode of preparing casks for a most important branch of trade, it may seem almost needless to suggest any other method of performing the same work, but the author being the first to discover the importance of applying heated currents to such a purpose, he feels it incumbent on him to state that there is still another element which he is not sure but must ere long supersede to a considerable extent the one before referred to. It is that of of superheated steam, the use of which was discovered lately by the author in rather a singular manner, namely, while engaged in some experiments with superheated steam, it occurred to him, seeing that there was an indicated temperature at the time of between 600 and 700 Fahr., that it would be well to try its effect upon a very bad stinking cask, which, being obtained, was subjected to the heat only ten minutes, when it was pronounced perfectly sweet. It is only necessary to add that the same result has attended many repetitions of the system, and although they have not all been attended with the same successful results, the author feels that it has not arisen from any fault in the principle, but from a want of sufficient practical data as to the exact temperature and also the amount of time which the casks can be safely exposed to this powerful agent.

On the Decortication of Cereals. By Charles Davison, C.E.

What is understood by the decortication of grain? It is a system by which the exterior envelope is taken off, so that there remains only the kernel of flour; in other words, decortication does to the grain what most persons do to fine fruit before eating, namely, they peel it, in order that the bitterness or coarseness of the skin may not diminish the flavour and goodness of that which is within.

Thus, decorticated grain is without the bitterness which the skin communicates, whether it be for making bread or for distillation; in fact, any one who has not tasted bread made from decorticated corn does not know the natural taste of wheat flour.

Corn is the most valuable of the farinaceous food of man, and it is important to know if the flour of old corn can be improved by decortication. Look, then, to the structure of a grain of corn, beginning from the outside. We find a gummy and resinous pellicule in order to protect the grain, at the same time not stopping the power of absorption, and it is easy to understand that this pellicule easily gets discoloured and charged with dust that must impart a bad taste; after this pellicule there is a thinner skin distilling the air and nourishing the kernel as through a thin veil. There is a third envelope, formed of impalpable dust, which acts as a sponge, absorbing the damp and stopping putrefaction, and giving a longer life to the kernel. These three envelopes form the brans, and are called in science, *Epiderme*, *Epicarpe*, and *Ludicarpe*. Under these three there is a thin skin, called in science, in France, "*Testa*." This skin sticks to the floury kernel, and surrounds it like a cuirass, and the object of the decorticator is to take off this cuirass, and strip it completely without injuring it.

After the *testa* we come to the germ of the grain, which surrounds the kernel like a crown, enlarging it towards the embryo. This is the flour "par excellence." Then come the particles the most glutinous, then the centre.

One can understand that in completely taking off the three brans of old wheat, or of Egyptian wheat, before grinding, the flour will necessarily be better. If the three brans be preserved separately, the inner one will be found in the form of a fine, black, bitter, bad-smelling dust.

What advantages, then, are to be obtained by Decortication?—The answer is 10 per cent. increase in quantity of flour (at least, upon wheat), and from 12 to 15 per cent. in barley and oats, and at the same time a finer colour and a better taste. The next question which arises is, "Ought the grinding of decorticated grain to be done in the same manner as undecorticated grain?" The answer is, "No." Having shown that the finest flour for taste and nourishment adheres to the skin, the grain must be pulverised to detach this flour from its envelope. You must then grind as fine as possible, so as not to heat the flour, then dress through a dressing-machine, of which the coarsest silk will not let through more than the third or fourth degree of fineness—thus you will obtain 80 per cent. of the weight of corn; then you will either regrind

or redress the remainder, so as to have 90 parts of flour from 100 parts of the corn decorticated. The 90 parts of flour will make a delicious and nourishing bread.

As to Decortication in a hygienic point of view, the flour of decorticated corn at 90 per cent. is more nutritious than ordinarily ground corn at 78 or 80. All the chemists (in France) who have analysed and compared flour from decorticated and undecorticated corn find 5 and 6 per cent. more gluten in the former than in the latter. The formation of the grain shows us that it must be so. In grinding undecorticated grain, to prevent the third bran from spoiling the colour of the flour, the stones are put so far apart that a large portion of the flour is suffered to escape in the brans, and we have seen that the exterior flour is richest in gluten and in phosphoric principles.

As in the ordinary millering, the greater part of this excellent flour is left in the bran, so flour from undecorticated corn, extracting 78 to 80 per cent. of the weight of the corn, is inferior in nourishment and in flavour to the flour of decorticated corn extracting 90 per cent. of the natural weight of the corn.

As regards the several qualities of bread, the decortication does not affect the different qualities that exist in the flour; the compartments of the dressing machine divide it, and one can always have bread more or less white according as the 1st, 2nd, or 3rd flours are more or less mixed. The quality of the 1st will be incomparable—but what is gained in whiteness is lost in taste and nourishment. Thus we say, the first flour will only be used for pastry and for very fine bread—it will be excluded from the table where bread is the principal food—and will be only used at the table of the luxurious.

It is better to make a quality with all flours united, making a wholesome and well-flavoured bread, and experience has proved that young people, more especially, fed with this bread will have a strong and vigorous constitution instead of the lymphatic blood produced by the white and tasteless bread in common use.

In order to obtain this complete decortication, the principle adopted by M. Poissant (the pioneer of this system) is that of causing a continuous rubbing of grain against grain by means of a well-devised machine—the result of many years' toil—but which it is hardly possible to describe here. Suffice it to say that it consists of two sets of revolving blades, driven at 300 or 400 revolutions per minute, which causes the grains to come into contact with each other in such a manner as to create a speedy expansion and separation of the skin, and as each skin is loosened, so is it driven off at stated and fixed periods by an arrangement of fanning.

It is necessary to observe that the grain, previous to decorticating, is immersed for a second or two in cold water, and allowed to drain for four or five minutes before it is put into the hopper of the machine. The next step before grinding is to take care that the grain is thoroughly dried, which is easily accomplished by rapid currents of heated air meeting the grain as it passes from the machine, it being observed that the moisture, through its immersion, is exceedingly slight, and altogether superficial.

It is a matter of singular yet great importance to know that corn and other cereals decorticated are not likely to be attacked by that destructive insect the weevil, that is, if the decorticated corn is carefully excluded from sunshine. Thus, to preserve decorticated corn, after it is properly dried, it should be put into barrels, or stored in close and air-tight granaries, where it will be found to keep for an indefinite period.

By way of recapitulation it may be stated,

1st. That decorticated grain will always be profitable to the world, as it incontestibly yields 10 to 12 per cent. more flour than ordinary millering.

2nd. It can be done in either small or large quantities, and not only produces from 10 to 12 per cent. more flour, but at the same time from 5 to 6 per cent. more glutinous nourishment.

3rd. Its non-susceptibility of attack from the weevil, and therefore its fitness for storing against periodical seasons of scarcity.

Lastly. The machines are simple, cheap, lasting, and capable of being worked either by hand or motive power at small cost, and have, in fact, no known drawbacks, except that pollard bran, &c., which is produced by the present method of millering, will no longer be an article of commerce. But as a set-off, the pellicule which is produced by the new system is found to make an excellent vellum-like paper, which is largely sought after in France by bookbinders.

The above is based partly on personal observation and examination, and partly from written communications from M. Poissant, whose whole life nearly has been devoted to this subject.

POSTAL AND TELEGRAPHIC COMMUNICATION IN FRANCE.

The *Annales Télégraphiques* states that the number of letters passing through the French post-office in 1862 was 300 millions, of which 1,820,000 were registered, and 976,047 were letters containing property of a declared value of 600 millions of francs. The number of newspapers, pamphlets, patterns, and small parcels, &c., was 190 millions.

The gross receipts of the post-office authorities were, in 1861, 66,781,363 francs; expenses, 42,748,373 francs, leaving a balance of 24,032,990 francs.

The accounts for 1862 are not completed, but the receipts amount to 69,906,000 francs.

The number of private telegraphic messages transmitted in 1862, by the telegraphs under Government management, was 1,521,000; the receipts were 5,315,000 francs.

To these must be added the private messages transmitted by railway companies, which amounted in the year to 80,000, producing a sum of 135,000 francs, so that the total number of private messages transmitted reaches 1,601,000, producing no less than 5,451,000 francs. The number of Government messages exceeded 500,000, representing an amount of more than two millions of francs.

It appears, then, that the more the tariff of postal and telegraphic communications has been lowered, the larger has been the total sum realised. The telegraph, so far from diminishing the number of letters, seems to have tended to increase it. The hours when the telegraph is principally in operation are from twelve to three, while the exchange is open, and when business is at its height.

IMPROVEMENT IN THE PREPARATION OF ESPARTO PULP.

Mr. Joseph Carbonnell, of Paris, gives the following description of an improved method of preparing and washing the paper pulp derived from Esparto:—

I take, say 200 lbs. weight of the esparto plant, or spartium in stalk, in the raw state, and place it in a wooden vat or trough, mixing with it 20 lbs. of alkali or salt of soda, and 30 lbs. of quicklime, and immediately filling the vat with cold water until the esparto is completely covered. This operation ended, I boil the esparto for four hours by means of steam conducted through copper tubes, winding in a serpentine manner through the vat. These tubes or pipes are pierced with small holes in their entire length, and do not extend beyond the middle of the vat, so that the steam is gradually distributed, issuing at the same time from the small holes and the orifices of the pipes. The second operation ended, the esparto is in a soft state, and I then drain off the liquid by a cock at the bottom of the vat. I then carry the esparto to a hydraulic press, and after pressing out the dirty matter and the liquid it contains, I place it, mixed with 50 per cent. of clear cold water, in a cylinder similar

to those used in paper-making, for triturating the rags. After fifteen minutes of trituration in this cylinder, the esparto becomes reduced to a fibrous matter, and I then throw in 24 lbs. of chloride of lime, thoroughly dissolved in clear water, and turn the cylinder until the chloride is well filled with esparto. I prepare in a small wooden trough, lined with lead, $1\frac{1}{2}$lb. of sulphuric acid (marking 66 per cent.) with 3 lbs. of clear cold water. I pour this liquid by degrees upon the pulp, which immediately assumes a reddish colour; but at the expiration of forty-five minutes it becomes and remains perfectly white. There remains but to warehouse the pulp for 24 hours, and it is fit for paper-making.

STATISTICS OF WRECKS.

The following is a synopsis of the returns made by the Board of Trade to Parliament of the wrecks and casualties which have taken place on the coasts and in the seas of the British Isles during the past year. The materials from which these valuable documents are compiled are derived from reports furnished by the officers of coast guard, and receivers of wreck, resident on the shores of the United Kingdom.

When it is remembered that the number of vessels which entered inwards and cleared outwards from different British ports in the course of the past year was 268,462, and that these ships had on board probably 1,610,000 men, it becomes almost a matter of certainty that a large number of casualties should take place amongst them every year.

The coasts of the British isles extend upwards of 5,000 miles, and on looking at the wreck charts which accompany the register, it is observed that there are few parts of that continuous shore which are not studded with the usual wreck marks; and thus it is that on nearly every page of the register this fact constantly presents itself—that during the year no less than 1,827 wrecks and casualties took place on our coasts, with the loss of 690 lives.

Compared with previous years the register states that the wreck experience of the past year is very unfavourable. But the number of lives lost is fortunately considerably under the average, owing chiefly to the valuable and prompt services of life-boats and other means employed on occasions of wrecks on our coast. The wrecks and casualties in the year show a large increase on the average of those during the preceding eleven years. The number of wrecks in the last eleven years was 13,657, while the total voyages made to and from British ports in that period were 2,745,910, so that one ship was wrecked out of every 201. During the past year, as previously stated, the number of voyages of vessels to and from ports in the United Kingdom was 268,462, and out of this large number 1,827 casualties occurred, or one in every 147.

In the past eleven years, from the above wrecks, 8,775 persons were lost, or nearly 800 each year. Last year it appears from the returns that the lives of 4,729 persons were imperilled on the coasts of the British isles, of which number 690, or 14·59 per cent. were lost. The wrecks and disasters for the year 1862 may be thus classed:—

	Vessels.
Totally wrecked	455
Seriously damaged	695
Totally lost in collision	66
Damaged seriously by collision	272
Injured by collision	339
Total	1,827

This number of disasters for last year is at the rate of five per day.

The months of January, February, March, October, November, and December were the most destructive to ships.

The publication of the Annual Register of the Board of Trade, and other means of publicity, have materially contributed to the establishment on our coasts of a system of life-boats and life-preserving apparatus, which reflects the greatest credit on the philanthropy of the age in which we live, and on the energy with which these means have been placed on our shores, by the joint action of the National Life-boat Institution and the Board of Trade.

By means of life-boats, the life-preserving apparatus, ships' own boats, and other means, 20,158 lives have been saved during the past seven years, of which 4,039 were rescued last year.

The following is a summary of the means used in saving the 4,039 lives from wrecks on the coasts of the United Kingdom during the past year:—

By life-boats and rocket and mortar apparatus	637
By ships, ships' own boats, shore boats, steamers, &c.	3,389
By individual exertion	13
Total	4,039

As usual, ships, ships' boats, and smacks have saved more lives in that period than the life-boats and the rocket and mortar apparatus. This apparent discrepancy is susceptible of easy explanation. When a disaster takes place in British waters, it frequently happens that either a ship or smack is fortunately at hand to render assistance to the crews of the distressed vessels. Such help is seldom attended with any very great danger (although sometimes it is so), and the men are often brought ashore before any tidings at all have reached a life-boat station. But the great value of the services rendered by life-boats can only be appreciated by considering that they are mostly performed on occasions when no other craft could be launched from the shore with safety.

Schooners and brigs were, as usual, the most numerous description of vessels that were lost during the past year on our shores. These are usually employed in our coasting and coal trade, and the destruction of hundreds of them even in moderate gales is now reduced to a matter of certainty.

In December last seven vessels foundered off the east coast of England, with the loss of all hands, while engaged in coasting voyages. One of them was a collier sloop 71 years of age. Another collier brig also foundered in October last, and seven out of nine of her crew were drowned. She was 99 years old.

The following is an analysis of the tonnage of the ships lost last year:—

	Vessels.
Vessels under 50 tons	341
51 and under 100 ,,	441
101 ,, 300 ,,	784
301 ,, 600 ,,	186
601 ,, 900 ,,	44
901 ,, 1,200 ,,	20
1,201 and upwards ,,	11
Total	1,827

The most destructive gales of wind were those that blew from S.W., S.S.W., W.S.W., and N.W.

The ages of some of the vessels that were destroyed were as follows:—

Under 3 years	122
3 and not exceeding 7 years	271
8 ,, ,, 10 ,,	131
11 ,, ,, 14 ,,	155
15 ,, ,, 20 ,,	216
21 ,, ,, 30 ,,	266
31 ,, ,, 40 ,,	125
41 ,, ,, 50 ,,	59
51 ,, ,, 60 ,,	25
61 ,, ,, 90 ,,	14
91 ,, ,, 100 ,,	1
Unknown	442
Total	1,827

In perfectly calm weather 23 vessels were wrecked; in light airs, 28; in light breezes, 56; in gentle breezes, 43; in moderate breezes, 110; in fresh breezes, 187; in strong breezes, 195; in moderate gales, 75; in fresh gales, 170; in strong gales, 199; in whole gales, 218; in storms, 63; in hurricanes, 69; and in unknown and variable weather, 52.

321 vessels were wrecked that were under the command of masters holding certificates of competency; while 720 were wrecked that were commanded by others who were not required by law to hold such certificates, and 266 that were commanded by foreigners not having British certificates.

Of the total wrecks during the past year on our shores, irrespective of collisions, 60 vessels foundered; 41 vessels were driven or run on a lee shore; 66 parted their cables, or dragged their anchors and went on shore; 40 were wrecked from damage to hull, or the loss of masts, yard, or sails; 3 were actually capsized; 72 were wrecked from inattention, carelessness, or neglect; 25 from defects in ships or equipments; 7 from a combination of causes, while 18 arose from accident.

Of the total wrecks that took place from collisions, 18 were from bad look-out; 22 because the rule of road at sea was not observed; 1 from the want of sea-room, 4 in thick and foggy weather, and 4 from neglecting to show lights; but it is worth observing that only 1 collision with total loss occurred from the error of the pilot who was on board; 4 occurred from negligence and want of caution.

It is a lamentable fact, in regard to collisions, that 141 took place in fine and clear weather, the whole number of collisions during the year being 338—102 in the day time and 236 in the night. Last year 11 collisions occurred between steamers, and 190 between sailing-vessels, while both were under way. 32 collisions also took place between sailing vessels, one being at anchor and the other under way at the time; but no collisions occurred between steamers under these circumstances. 46 collisions likewise took place between steamers and sailing vessels, both being under way; and 6 only when sailing-vessels at anchor were run into by steamers. 53 collisions also occurred by vessels breaking from their anchors or moorings. It is hoped that the admirable regulations which the Board of Trade have just published to prevent collisions at sea will materially tend to lessen the number of these fearful disasters.

The most disastrous wrecks, with the greatest loss of life, occur between that part of the coast extending from Skerries and Lambay to Fair Head and Mull of Kantyre. During the past thirteen years 1641 lives were lost in that district. The next is from the North Foreland to St. Katherine's Point, which during the same period claims 1,136 lives.

The estimated loss of property involved in the destruction of a portion only of the vessels wrecked in the last six years amounted to four and a half millions of pounds sterling, although the total amount, being unreported, cannot be ascertained.

In these six years the number of lives rescued by life-boats and the life-saving apparatus alone was 4,169. It may be proper to observe that these means of saving life are rarely used except under the most perilous circumstances.

The National Life-boat Institution has now 125 life-boats under its management. During the past year, in addition to saving twenty-one vessels from destruction, 358 lives were rescued by the life-boats of the Society. For these services rewards amounting to £915 18s. 1d. were voted. The number of lives saved by the life-boats of the Society, or by special exertions, for which it has granted rewards since its formation, is 13,220. For these services 82 gold medals, 733 silver medals, and £17,200 in cash have been granted as rewards. The Institution has also expended £75,380 on life-boats, life-boat transporting carriages, and boat-houses.

Proceedings of Institutions.

Ebbw Vale Literary and Scientific Institution.—The last report says that a retrospect of the proceedings of the past year, and a view of the present state and future prospects of the Institution, tend to produce a much more hopeful feeling than was entertained on the last occasion. The rooms have been remarkably well attended, and the number of subscribers, whose names have been entered upon the books has risen to 314 (exclusive of honorary members). 1st quarter, July to October, 210; 2nd quarter, to December, 229; 3rd quarter, to April, 224; 4th quarter, to July, 230. But the augury for the future good of the Institution is to be derived, not so much from the increase in the number of subscribers as from certain indications that the minds of the inhabitants of the valley are becoming gradually more alive to the fact that great privileges are within their reach, and that seldom or ever (at so low a cost) have such advantages been offered for improving themselves by education and mental culture, and thus elevating their position. During the past year an elementary instruction class, numbering 40 members, has been formed; this class, for the greater convenience of working, has been subdivided under the different heads of mechanical drawing, grammar, reading, writing, and dictation, and arithmetic, and these meet respectively on Monday, Tuesday, Wednesday, and Thursday evenings. These have been kindly presided over by Messrs. Thomas Morgan, W. J. Gwyther, Thomas Henry, and Charles Newman, to whom the committee are much indebted for their services. It is true, that in consequence of the inconveniently small size of the class room, the meetings of all but the mechanical drawing class have for a time been suspended; but a room more convenient, larger, and well adapted for the purpose is in course of completion, and it is confidently hoped that in a short time the whole of the class will resume its sittings. Since September, 1861, there has been formed a Welsh Grammar Class, meeting on every Friday evening; the number of members in this class is 16, and the average nightly attendance 13. In this class the members exercise themselves in reading, translating the best specimens of English prose composition into Welsh, in delivering short essays in that language, and in discussions. Small prizes also have been competed for amongst the members, and altogether the meetings have been very successfully conducted. In order to encourage in some measure these praiseworthy efforts at self-culture, a few of the members of the committee, assisted by some friends of the Institution, have established on a small scale a local prize scheme, offering prizes for the best Welsh and English compositions on various subjects; at present it may be regarded merely as an experiment; the subject for this year in both English and Welsh is, "The advantages to be derived by working men from Literary and Scientific Institutions." Prizes of equal amount will be awarded to the successful essays in both languages; first prize, £2 10s., second prize, £1. The adjudicators are the Rev. C. F. C. Pigott, M.A., of Llanwenarth, and the Rev. Wm. Roberts, of Blaenau. Six English, and three Welsh compositions have been sent in. The report of the adjudicators has not yet been received by the committee. The committee hope that at no very distant period some of the members will avail themselves of the assistance and advantages which this Institution possesses by being connected with the Society of Arts, and become competitors for the prizes annually offered by that body. On the unexpected retirement of Mr. Small, who had most efficiently filled the office of honorary librarian for four years, the committee secured the services of Mr. Charles Newman, who reports favourably with regard to this department. The issue of books for this year has exceeded that of the last by 504, being the difference between 2,646 and 3,150. The subjoined is an approach towards a classification:—

	English.	Welsh.		English.	Welsh.
History	121	37	Tales & Novels	1,179	11
Biography	149	10	Gen. Literature	731	100
Voyages & Travels	165	13	Religious Literature	124	109
Art, Science, and Philosophy	195	24	Poetry	103	79

The library now numbers 1,427 volumes, of which 45 have been added this year. Some presents of books, together with gratuitous additions made to the museum, appear to evince an increased interest in the Institution, which is very gratifying; during the last year upwards of 60 ancient and modern, foreign and English coins have been presented; eight specimens illustrative of Natural History; 20 geological and mineralogical specimens; together with many curious and interesting objects. The reading room has been exceedingly well frequented. The annual soirée was most satisfactory; it attracted the attendance of about 600 members and friends. The expenses were considerably lessened by the valuable services of several lady and gentleman amateurs, who sang a variety of glees and madrigals; by the gratuitous services of the Ebbw Vale Rifle Volunteer Band, and by the kind assistance of the lady members and friends who presided over the refreshment tables. To these circumstances may be attributed the balance of £8 1s. 11d. in favour of the Lecture and Entertainment Committee. In addition, two entertainments have been given this year, one entitled "Shadows on the Wall," by Mr. Basil Young; and the other (Musical) by Mr. Owen, of Chester, and others. By these the sum of £3 8s. 8d. was realised. A lecture on "The Philosophy of True Manliness," was given by Mr. Vincent. The income has been £80 4s. 1d., and there is a balance in hand of £11 10s. 10d. In addition to the above balance, the old debt due to the treasurer at the close of last year has been liquidated.

Hastings Mechanics' Institution.—The last report says that the following lectures have been delivered during the past session:—Mr. T. Warr, "The Tonic Sol-Fa Method of Singing;" B. W. Hawkins, Esq., "The Age of Dragons;" Rev. T. Harding, "The Earth as a Planet;" Discussion, "Is the Reading of the Works of Fiction to be approved, and to what extent?" Dr. Moore, "The Will as a Force;" J. G. Fitch, Esq., "Dr. Arnold;" W. D. Lucas-Shadwell, Esq., "Mighty Ends from Small Beginnings;" J. C. Savery, Esq., "On Food;" Mr. Butler, "Philosophy of a Candle;" S. Sharpe, Esq., "Temple of Jerusalem;" G. Butler, Esq., "Literary Reading;" Dr. Hunt, "Lectures and Lecturing;" G. Dawson, Esq., "Ill-Used Men;" W. Stokes, Esq., "On Memory;" J. Q. Rumball, Esq., "On the Gorilla;" Mr. John Banks, "Smugglers and Smuggling;" G. Butler, Esq., "Literary Reading." The lectures, on the whole, have been well attended. The entire receipts from them were £15 3s., and the expenditure £19 12s.; so that the average cost of each lecture was 5s. 2¾d. This is an improvement over the last annual report, when the lectures cost 17s. 1d. each. The income for the year was £173 5s. 2d., and the expenditure £160 15s. 9d.; there being no outstanding accounts, the balance in hand of £12 9s. 5d. shows the exact financial position of the Institution. 91 volumes have been added to the library during the year, at a cost of £21 7s. 3d. During the same time 3,259 books have been in circulation. During the last quarter 22 have joined the Institution, and 19 have left; the present number is 336. During the whole year 125 have joined, and 97 have left. The classes have not been attended so well as the committee could wish, although a decided improvement has taken place in this part of the operations of the Society. Three classes are now in existence: the French, conducted by Mr. T. Edwards; Drawing, by Mr. S. C. Burgess; and Arithmetic, by Mr. F. W. Wormersley. Efforts will be made to continue these classes through the summer. A proposal to offer small prizes for efficiency in these departments of learning has been made, which, it is hoped, may do something to stimulate many of the young men to greater mental activity. It is in these regular methods of instruction, after all, that the most important means of doing permanent good are to be found. This fact the committee earnestly urge on the consideration of the younger members, that they may do something better than employ their time in desultory reading. The committee conclude by congratulating the members on the healthy life of the Institution, and by expressing a hope that the principles by which that life has been kept up may continue to be maintained. Many similar Institutions have come to an end during the lifetime of this, chiefly because they have been unfaithful to their mission. The committee earnestly invite the members to co-operate with them still in the great work of refining the taste and educating the minds of the middle and working classes.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, September 18th*, 1863.]

Dated 8th September, 1863.

2222. W. Clark, 53, Chancery-lane—Imp. in the means of utilizing refuse azoted matters of commerce for the manufacture of various chemical products. (A com.)
2224. G. T. Bousfield, Loughborough-park, Brixton—Imp. in rollers to be used in machinery for spinning and manufacturing wool, cotton, and other fibrous materials. (A com.)
2226. A. V. Newton, 66, Chancery-lane—An imp. in steam engines. (A com.)
2228. E. Oliver and G. Myers, Rotherham—Imp. in apparatus for lowering and disengaging boats from vessels.

[*From Gazette, September 25th*, 1863.]

Dated 11th June, 1863.

1449. W. Clark, 53, Chancery-lane—Imp. in obtaining and applying motive power, and in apparatus for the same. (A com.)

Dated 30th July, 1863.

1887. J. B. Howell, Sheffield—Imp. in ordnance, fire-arms, and projectiles.

Dated 17th August, 1863.

2041. R. Baillie, Glasgow—Imp. in reefing or furling the sails of vessels, and in the apparatus to be employed therein.

Dated 18th August, 1863.

2056. C. G. Wilson, Blackheath—Imp. in machinery for pressing cotton, and for crushing and pressing other substances, the said machinery being adaptable for locomotion on railways or on common roads.

Dated 27th August, 1863.

2119. C. Richard, 10, Rue de la Fidelité, Paris—A new or improved apparatus for lighting and cutting the ends of cigars.

Dated 31st August, 1863.

2145. G. Attock, Stratford, Essex—Imp. in assistant bearing springs for locomotive engines, railway carriages, waggons, and trucks.
2148. G. Bebbington and J. R. Hampson, Manchester—Certain imp. in means to be employed for securing the ends of bands in packing "bale goods," and in machinery for manufacturing "rivets" to be employed for the purpose, and also in apparatus for forming apertures in the aforesaid bands or hoops.

Dated 1st September, 1863.

2160. P. Joyot, jun., Paris—An improved fabric, and improvements in looms for manufacturing the same.
2161. J. H. Banks, Radnor-street, Hulme, Manchester—Imp. in the construction of benches or desks for schools, churches, and other similar purposes.

Dated 2nd September, 1863.

2167. R. Young, Glasgow—Imp. in separating and elevating apparatus for grain or granular matters.
2168. E. Collier, High-street, Leicester—Imp. in crinolines and crinoline fastenings.
2171. E. Alcan, King-street—A new method of and apparatus for feeding wool and other textile and filamentous substances into carding, combing, and other machines for treating such substances. (A com.)

Dated 3rd September, 1863.

2173. C. Jackson, Birmingham—Imp. in bolts for fastening doors, windows, shutters, and for other like purposes.
2175. A. A. Beaumont, 2, Rue Sainte Appoline, Paris—A new or improved engine for raising liquids.
2181. A. V. Newton, 66, Chancery-lane—Improved apparatus for cleaning and decorticating grain and seeds. (A com.)

Dated 5th September, 1863.

2187. W. Lorberg, 4, Wyld's-rents, Bermondsey—Imp. in the manufacture of gas and other substances from tan and similar materials.

2189. S. Mellbourn, Carshalton, Surrey—Imp. in the preparation of materials for the manufacture of paper, and in the construction of machinery employed for such purposes.
2191. T. Moody, Wincanton, Somersetshire, and E. T. Moody, Chelsea-villas, West Brompton—Imp. in the generation and production of motive power to be applied generally, and in its special application to the propulsion of vessels.
2192. J. Rowell, Aberdeen—Imp. in the manufacture and construction of fences, part of which are also applicable to the manufacture and construction of gate posts, and to poles and posts used for telegraph and signal purposes, and for stretching telegraph wires.
2193. T. Smith, Wolverhampton—An improved waggon break.
2195. C. H. Adames, Birmingham—Imp. in the manufacture of lids or covers for certain articles of hollow ware.

Dated 7th September, 1863.

2197. F. Mills, T. Booth, and T. Clegg, Heywood, Lancashire—Imp. in machinery for preparing and spinning cotton and other fibrous substances.
2199. N. Singleton, Manchester—Certain imp. in machinery or apparatus for cutting hay, straw, or other similar agricultural produce. (A com.)
2201. A. V. Newton, 66, Chancery-lane—Improved apparatus for directing motion in right lines. (A com.)

Dated 8th September, 1863.

2203. L. Mond, Appleton-in-Widness, Lancashire—Imp. in obtaining sulphur and sulphurous acid from alkali waste.
2205. J. C. Lott, Clyro (near Hay), Radnorshire—Improved apparatus for turning over the leaves of music.
2208. T. H. Baker and G. Friend, Tunbridge, Kent—Imp. in treating excrementitious and sewage matters, and in the means or apparatus employed therein.
2209. R. A. Brooman, 166, Fleet-street—Imp. in machines for working and preparing skins. (A com.)

Dated 9th September, 1863.

2213. W. H. Tucker, 6, Southampton-street, Strand—Imp. in the modes of propelling and steering vessels.
2217. W. Glydon, jun., Birmingham—Imp. in apparatus and machinery for the manufacture of metallic tubes and hollow cylinders, part of which imp. may also be applied to the casting of other hollow bodies.
2219. W. E. Gedge, 11, Wellington-street, Strand—Imp. in paving roads or ways. (A com.)
2221. J. Robinson, Batley, Yorkshire—Imp. in steam boiler and other furnaces.
2223. N. Thompson, 15, Abbey-gardens, St. John's-wood—Imp. in apparatus for stopping bottles, jars, and other vessels, which imp. are also applicable for stopping the muzzles of fire-arms.
2225. W. Hutchinson, Salford—Imp. in steam engines.
2227. J. Maggs, Bartlet-street, Bath, Somersetshire—An improved construction of fountain pen.

Dated 10th September, 1863.

2231. W. W. Greener, Birmingham—Imp. in breech-loading fire-arms.
2232. H. Wright and J. W. Wright, Freedom Mills, Morton, near Bingley, and W. Clough, Keighley, Yorkshire—Imp. in glazing and rolling press papers, pasteboard, and other paper requiring to be glazed or rolled, and in the means or apparatus employed therein.
2233. M. A. Muir and J. McIlwham, Glasgow—Imp. in machinery or apparatus for winding yarns or thread.
2234. W. Clark, 53, Chancery-lane—Imp. in the purification and disinfection of hydro-carburets, and especially of oils produced by the distillation of coal schist and boghead. (A com.)
2235. J. H. Whitehead, Royal George Mills, near Manchester—Imp. in the manufacture of felted fabrics.

Dated 11th September, 1863.

2236. J. Hartshorn and W. Redgate, Nottingham—Imp. in the manufacture of lace, and in means or apparatus employed therein.
2237. W. Taylor, Lawton Iron Works, Shiffnal, Shropshire—Imp. in the manufacture of iron rods, and in machinery to be employed in the said manufacture.
2238. L. Desens, 18, Rue de l'Echiquier, Paris—An improved bath or bathing machine adapted for deep water.
2239. T. J. Sloan, Paris—Certain imp. in braiding machines.
2240. J. Rhodes, Morley, near Leeds—An imp. in piecing machines.
2242. J. Dobbie, St. Petersburg, Russia—Imp. in the construction of railway and other carriages.
2243. J. D. Lee and J. Crabtree, Shipley, near Bradford—Imp. in looms for weaving.
2244. H. Chrichley, Birmingham—Imp. in stove grates and kitchen ranges.
2245. M. Gerstenhofer, Freiberg, Saxony—An improved construction of furnace for roasting pyrites.

Dated 12th September, 1863.

2246. J. Crellin, Lime street, Liverpool—Imp. in apparatus for governing and stopping the flow or passage of liquids.
2247. J. King, Glasgow—Improved means for assisting and regulating the process of fermentation.
2248. C. E. Wallis, Millman-street, Bedford-row, Holborn—Imp. in revolving fire-arms.
2249. E. N. Gregory, Camberwell, Surrey—An improved method of uniting belts and lengths of wire gauze and other metal cloth.
2250. W. Clark, 53, Chancery-lane—Imp. in revolving fire-arms. (A com.)
2251. D. S. Sutherland, 34, Great George-street, Westminster—Imp. in blasting rocks and other materials.
2252. J. A. Whipple, Boston, U.S.—Imp. in apparatus for supporting photograph cameras.

Dated 14th September, 1863.

2254. W. R. Hutton, Glasgow—An improved lubricating compound.
2255. T. Bell, Wishaw, N.B.—Imp. in apparatus for distilling shale or other bituminous minerals.
2257. G. F. Millin, Oxford—Improved arrangements for facilitating the quick detachment of horses or draught animals from carriages or vehicles, and for the application of break-power with the view to prevent accidents.
2258. G. W. Billings, New York, U.S.—An improved method of preparing the fibres of hemp, flax, and other vegetable materials, for manufacturing purposes.
2259. W. Gassage, Widnes, Lancashire—Imp. in drying or curing certain vegetable productions.

Dated 15th September, 1863.

2260. C. Battcock, Wandsworth—Imp. in cigar lighters and fusee matches, part of said imps. being applicable also to vestas and matches, wax tapers, and candles.
2261. G. Howell, Old Kent-road—Imp. in machinery for stamping or obliterating and printing, especially applicable to post-office purposes, parts of which imps. are applicable to machines in which cams are employed.
2262. W. Thompson, 5, Rue Neuve des Martyres, Paris—Imp. in electric telegraph apparatus.
2263. A. Barclay, Kilmarnock, Ayr, N.B.—Imp. in locomotives or other steam engines.

Dated 16th September, 1863.

2267. J. Cox, George Mills, Edinburgh—An imp. in swings.
2268. J. Rahill, Minories—Imp. in liquid compasses.
2269. A. Watson, King-street—An imp. in hinges.
2270. J. Daunatt, Sunderland—Imp. in the construction of apparatus for cooling liquids.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2320. W. Elsdon, Sandridge, Bourke, Victoria—The construction of rail and road carriages and improved wheel tires, and an imp. in railway crossings, adapting them to such carriages.—21st September, 1863.

PATENTS SEALED.

[*From Gazette, September 25th*, 1863.]

25th September.
326. H. Dircks & J. H. Pepper.
803. R. A. Brooman.
813. W. Symons.
815. J. Dale and G. Bischof, jun.
819. H. Hughes.
820. J. Carver.
824. E. T. Hughes.
825. J. Smethurst.
826. A. B. D. Maurand.
830. R. A. Brooman.
835. J. Hindle, W. F. Calvert, and E. Thornton.
836. I. Rowland.
837. J. Bray.
840. W. West.
841. W. Mitchell.
845. W. H. Phillips.
846. J. W. Law and J. Inglis.
847. E. F. Clarke.
849. J. Cassell.
850. J. J. Potel.
853. A. P. Price.
854. A. B. Seithen.
856. J. Blain.
857. P. Hanrez.
897. A. Hett and F. W. Basset.
924. J. Ramsbottom.
936. W. Keats and J. Keats.
937. J. Combe & H. Smallpage.
938. J. Keats and W. S. Clark.
957. C. Terrett.
970. C. Turner.
971. B. J. Webber.
1006. G. B. Barber.
1067. J. H. Johnson.
1118. E. Chesshire.
1168. E. R. Clark.
1310. P. Leprovost.
1324. M. Henry.
1397. W. E. Newton.
1599. D. Hussey.
1670. J. Oxley.
1710. P. G. B. Westmacott.
1712. P. G. B. Westmacott.
1761. R. Hornsby jun., and J. E. Phillips.
1800. G. F. Wilson & G. Payne.
1878. N. Thompson.
1881. W. E. Newton.
1890. R. Hoe and H. J. Cole.
1900. R. Stewart.
2009. S. R. Wilmot.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, September 29th*, 1863.]

21st September.
2316. J. H. Tuck.
2461. T. Barnett.
23rd September.
2322. J. H. Johnson.
2325. C. Kind.
24th September.
2335. W. Hargreaves.
2340. J. McCrossan.
2348. M. Jacoby and J. Stones.
2363. A. Warner.
2386. J. L. Norton.
25th September.
2338. F. W. Daehne.
2351. W. A. Martin & J. Purdie.
26th September.
2352. A. F. Sheppard.
2357. J. A. Callander.
2364. T. Robinson.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, September 29th*, 1863.]

24th September.
2349. W. Marriott & D. Sugden.
25th September.
2265. D. Law and J. Inglis.
2267. F. Ransome.
2293. J. Daughlish.

Journal of the Society of Arts.

FRIDAY, OCTOBER 9, 1863.

THE LATE WILLIAM TOOKE, PRESIDENT OF THE SOCIETY.

A letter from Mr. Arthur Tooke, announcing the death of his father, having been laid before the Council specially summoned, the following resolution was unanimously passed, and the Secretary was instructed to communicate it to the family of the deceased :—

The Council having learnt, with deep regret, the death of William Tooke, Esq., the President of the Society, desire to record their high sense of the valuable services he rendered to the Society during the long period of 61 years, and to express their condolence with Arthur Tooke, Esq., his son, and the other members of his family, on the loss which they have sustained.

THE IRON TRADE OF BELGIUM.

The following account of the Iron Trade of Belgium appears in the official report by Her Majesty's Secretary of Legation at Brussels :—

Iron ore is found in abundance in every province of Belgium, but principally in Namur, Hainaut, Liege, and Luxembourg—the four mining provinces. That found in the five Northern Provinces is all so-called "alluvial" ore found on the surface, and not in subterranean mines. The following are the three main varieties of ore raised in Belgium.

Pyrites, a combination of sulphur and iron, long treated by the Custom-house solely as iron ore, and as such prohibited from export, by an erroneous interpretation of the tariff. It is now recognised to be worthless for its ferruginous constituents, but is much demanded, and exported in large quantities to France and England, for the purpose of making sulphuric acid.

Oligist ore is a red oxyde of iron, generally impregnated with phosphorus in such large proportions as to yield a pig iron too brittle for refining purposes. It used to be quite neglected until M. Behr, the director of the Ongrée Iron Works, in conjunction with M. Montefiore Levi, discovered a means of utilising it by mixing it in the furnace with a flux composed of carboniferous schist mixed with limestone. Thus oligist becomes available in the furnace in combination with yellow ore in the proportion of 60 per 100, and even alone. This Belgian invention has tended to reduce the price, and also the general quality of the metal. The prices of oligist ore vary from 6 to 15 francs per ton.

The third description is hydrated or yellow ore, and includes a great many varieties, of which the brown hematite is the best. Hydrated ore is only used for the best iron. Some rich seams of it are found in Belgium, especially at Athus, and Ruette in Luxembourg, and at Morialmé Fraire, Acoz, Ligny, Jamiolle, Tres Gomezée, Bois des Minières, and Courin, nearly all in the province of Namur. These are ores of the first quality, and give a yield of 40 per cent. in the furnace. This description of ore is still prohibited from export, excepting to France and the Grand Duchy of Luxembourg.

Since 1830, great anarchy has crept into the administration of the iron mines. The organic law of 1810 lays down the principles by which they are still nominally governed. All deposits of iron ores in subterranean veins or strata are by that law classified under the head of mines, and are not to be worked without a concession emanating from the Crown. All superficial or alluvial beds of ore are classified as "minières," and may be worked by the owner of the land, on simply serving a declaration to that effect on the provincial authorities. This legal distinction is now generally evaded. The great bulk of the iron produce is now raised from the so-called "free iron mines," *i.e.*, mines not legally conceded. Only 20 mines are provided with concessions; all the others, nearly 2,000 in number, situated in 109 different communes of the four mining provinces alone, are tolerated to exist without restriction or taxation, under the name of "minières," though most of them are subterraneous. The number of these pits in 1855 was 1,208, and the labourers employed in them were 5,271; the number of communes was 64. As the number of communes having such mines has increased since then to 109, it may be presumed that the number of pits and hands employed has risen in a similar proportion. This irregularity has led to an improvident working, and even to the total destruction by water of valuable mines. Every landlord is allowed to carry on his works in his own way, subject to the control of the inspectors only for the prevention of accidents to the workmen or to the houses on the surface. Some law on this subject is urgently called for, as the tribunals refuse to execute the ancient law, and no new concessions can be granted.

The principality of Liege and the county of Namur were two of the earliest seats of the iron manufacture, and even claim the invention of the art of manipulating iron by means of coal, as also of the high-blast furnace for producing pig-iron. The first of these is said to have been that of Marche-les-Dames, erected in 1340. The earliest furnaces on record were on the low Catalan principle, which yields at the first fusion malleable iron. The high-blast furnace and the art of casting were brought to great perfection at Liege as early as in the sixteenth century. Here, as in England, fruitless efforts were long made with a view of applying coal and coke to the production of crude iron. This great economical revolution was accomplished in England in 1730, but not till 1821 in Belgium.

One of the first coke-blast furnaces was established in 1823, at Seraing by Mr. John Cockerill. The extensive iron works at that place had been founded by him in 1817, with the assistance of the king. His Majesty even became a joint proprietor of them by purchasing, in 1825, the share belonging to Mr. Cockerill's brother. This factory was long without a rival on the Continent, both for its gigantic size and perfect internal economy. Mr. Cockerill showed no less genius in his financial than his mechanical combinations, and became one of the founders of the National Bank. Unfortunately his restless spirit impelled him to embark in a great number (no less than sixty) of other enterprises in distant countries, even in Surinam. The Belgian Revolution was the first event that checked his career. The new government claimed to succeed to the rights of King William, until Mr. Cockerill, by a great financial effort, made himself sole master of Seraing, and brought it to its highest pitch of prosperity in 1838. The National Bank having suspended payment in that year, Mr. Cockerill was obliged to adopt the same course. He died in 1840, leaving an untarnished reputation as a liberal employer of labour, a daring but honourable speculator, and a father of Belgian manufacturing industry. The Seraing works are now carried on by a flourishing "anonyme" company, under the name of "Société de John Cockerill," and still enjoy a European celebrity and custom. They include within the same area a coal-mine, six blast furnaces, an iron factory provided with every apparatus, a steel puddling-mill, and machine factory.

Belgium possessed in 1820 about fifty iron blast-furnaces adapted for charcoal, and not one for coke. Since then a great number of the latter have sprung up in the coal-basins

of Liege and Charleroy. Numerous refining and cupola furnaces, as well as puddling, rolling, hammering, splitting, and wire mills, have been erected and provided with the best appliances. The wealth created by this metal alone was estimated at 81,000,000 francs in 1860, and the exports at 24,750,000 francs. Belgium does not possess, like Wales, beds of iron and coal overlying each other in the same mine, but possesses both minerals in close proximity to each other.

The number of smelting-furnaces in blast has fallen from sixty-six in 1857 to fifty-one in 1860, only one more than in 1820; but these fifty-one being all, with eight exceptions, adapted for coke, produced 319,943 tons of pig-iron, valued at 26,500,000 francs, probably four times the amount of the earlier period. Still these figures show a great falling off since 1857. There is still a small quantity of charcoal-iron produced in the province of Namur, valued at 128 francs per ton, or 50 per cent. above the average of coke-iron. Not a single charcoal furnace remains in blast in Luxembourg, though this province is the richest in forests and in good ores. A short summary of the fluctuations of the iron trade will be afforded by the following Tables:—

Comparative Statement of the Iron Furnaces and other Metal Works in Blast, and of the number of Hands employed therein, during the following Years:—

	Factories.			Workmen.		
	1851.	1857.	1860.	1851.	1857.	1860.
Iron smelting furnaces	46	66	51	3,067	4,423	4,078
Iron foundries	85	103	127	1,446	2,501	2,847
Iron works for manufacture of wrought iron	102	95	87	3,111	5,438	6,604
Iron works for elaboration of wrought iron	85	79	82	498	851	1,067
Steel works	...	2	4	...	250	275
Lead works	8	9	20	52	118	218
Copper works	19	15	11	122	282	206
Zinc works	19	20	23	1,947	2,750	3,019
Alum works	2	1	1	11	68	85
Glass works	39	47	45	2,644	5,652	6,194
Totals	405	437	451	12,898	22,333	24,593

Comparative Statement of the Prices, at Charleroy, of the Principal Descriptions of Iron, in January of the following Years, per Ton of 1,000 Kilogrammes, equal to 0·984 of an English Ton.

Description of Iron.	1851.	1855.	1857.	1860.	1861.	1862.
	Fr.	Fr.	Fr.	Fr.	Fr.	Fr.
Pig-iron, forge	70	110	110	90	77½	77½
Do. foundry, No. 1	115	150	160	112	105	110
Do. foundry, No. 5	125	150	120	90	125	125
Do. charcoal	125	175	...	155	125	125
Bar-iron, rolled, No. 1	140	210	220	165	155	160
Do. rolled, No. 2	170	230	240	185	175	180
Do. strong, No. 3	200	250	260	205	195	200
Rails and accessories	170	190	215	170	157½	157½
Split-iron, soft.........per ½ ton.	58	92	100	77	69	70
Do. for nails, medium ,,	66	100	110	86	75	76
Do. best strong .... ,,	74	108	120	94	81	82
Sheet-iron, 1st quality	280	350	370	260	230	230
Do. 2nd quality	270	340	340	250	220	220
Do. fine	330	410	380	290	270	280

The enormous increase in the produce of iron has not taken place without some sacrifice of quality. Bars and rails of the present day are not what they were even ten years ago. Belgian irons compete closely with our own in quality and price. In the former respect they are superior to our ordinary descriptions, which is attributed to the universal employment of coke in Belgian furnaces instead of coal, as is usual in England. The grey pig-irons generally used in England are certainly superior to the white irons used in Belgium, but they require a larger amount of puddling than the high price of labour generally enables them to receive; so that when turned out in that imperfect state they are inferior to white irons for refining purposes. Belgian bars may on an average be classed below those of Yorkshire, especially those of Lowmoor, on a par with Staffordshire, and above Welsh irons. Belgian foundry iron has more tenacity, but less ductility, than the English article, owing also to the use of coke.

Great improvements have been introduced in the manufacture of iron of late years, especially Calder's hot blast. A patent has been taken out by a Belgian engineer, M. Fromont, and generally introduced, whereby the hot blast can be intensified to a temperature of 500 degrees for making foundry iron. Some articles of wrought iron, such as wheel-tires without joints, and fish-joint bolts, can be made in Belgium more cheaply than in England; so that a British firm which has lately taken an extensive contract in Holland has ordered these accessories in Belgium. In rails, none can undersell the Welsh, but the Belgians compete successfully with them, owing to differences of quality in foreign markets. Thus, at a recent extensive adjudication in the South of France, a Hainaut firm obtained a contract for 12,000 tons of rails at 20 francs per ton higher than a tender submitted by a Welsh house.

Belgian sheet iron, particularly the best quality, called "tôles fines de commerce," is much esteemed in and much exported to France. Split iron is little used in France, but is still produced in Belgium in large quantities for the nail-makers, who prefer it on account of its cheapness to rod-iron. The nail manufacture is another Belgian staple, which has attained immense proportions: it offers the great advantage of being exercised in the workman's own house, at his own fire-side, and even in his own kitchen fire; it is the winter employment of thousands, who in spring migrate to France to make bricks. Belgian nails are exported to all parts of the world.

The exports of machinery have increased from 4,750,000 francs in 1851 to 13,000,000 francs in 1861; still complaints are made of insufficient profits, owing to the constant fall of prices in the rolling stock of railways. The French and German markets are completely closed against this branch of Belgian industry. The Russian demand is great and increasing. Italy, Spain, and Portugal take many locomotive engines annually. A fine specimen of this article, the work of the Couillet iron factory, was seen at the London Exhibition.

The history of the arms trade seems to be one of unbroken prosperity; the demand seems to be insatiable. The year 1860 already showed the largest export of small arms on record, but was surpassed in the proportion of 2 to 3 by its successor, which showed an export of 18,000,000 francs in value. All the muskets that could possibly be supplied have been hurried off to the United States, at a great pecuniary profit to Liege. This branch of industry has been also much benefited by orders for rifles executed for her Majesty's Government; these arms are subjected to unusually severe trials, and have thus been the means of raising the standard of quality of the higher class of Liege small-arms. The wages of labour in this trade have risen to an unprecedented height; nevertheless, some skilled mechanics formerly engaged on fowling-pieces of high finish have been out of work, or have been obliged to learn to make muskets. The Liege arms manufacture is principally carried on by the men in their own houses. The numbers of fire-arms tested at the Liege "banc d'épreuves," exclusive of those manufactured at the Royal foundry, were in 1859, 481,767; in 1860, 562,279.

The iron exports of all kinds have risen from 11,750,000 francs in 1851 to 25,000,000 francs in 1857 and 1860; the values for 1861 are not yet assessed, but the quantities show an increase on the whole, though a decrease in some articles, such as nails and rails. The export of pig-iron has receded since 1857, owing to the increase of duty in the Zollverein; but that of ores and wrought iron has been and is constantly progressing. The

year 1861 has been one of depression, but not of total stagnation; prices have fallen back to the ruinous figures of 1847, and the profits of the blast furnaces have been little or nothing. The iron factories have done rather better, and have been fully employed, though at low rates.

The Belgian iron masters have shown themselves advocates of progress and free trade; they have declared themselves ready to meet English competition, though at present in possession of a virtual monopoly of the home trade. Some small quantities of Swedish pig-iron, and of English wire, steel, and hardware are imported. Every effort is made by this powerful industry to force a sale of its produce abroad. Four of the great Hainaut firms, those of Couillet, Monceau, Châtelineau, and Thyle-Château, have combined to form an "Union Sidérurgique" for the purpose of maintaining joint agents in foreign countries to canvass for orders. The shares and profits of all these undertakings have fallen to a low ebb. The last quotations show a slight reaction in prices; the firmness of the English market is acting on that of Belgium.

BRITISH ASSOCIATION, NEWCASTLE-ON-TYNE, 1863.

The following paper was read in Section G:—

On Rendering Vessels Comparatively Unsinkable, Facilitating the Stoppage of Shot-holes below Water, and Adapting our Present Vessels constructed of Timber for Effective Foreign Service.

By Admiral Sir Edward Belcher.

It has been so generally admitted that all complicated inventions are the result of some previous discovery, or the adaptation or taking advantage of the brains of others, whose ideas we have worked and sometimes improved upon, that one scarcely ventures in these days of challenge to assume that his faculties belong to himself. Indeed, we are indebted to former inventions for nine-tenths of the improved structures we now protect by patents, and it is a fact too well known that when we, as naval officers, give to the Government our ideas, that we lose our patent rights—receive no consideration in return, and frequently have the mortification of witnessing useful and valuable *bonâ fide* inventions slighted and thrown aside, at some future day to be modified and patented by others, and then patronised, because they are the patented offspring of civilians.

In the present instance I may say, not that I have modified the invention of a highly talented man, but that, urged by him in a career of invention, and aided by practical chemical pursuits, I adapted the well-known action of the pneumatic trough, not only for the purpose of rendering ships unsinkable, but for effecting the floating camel, now termed also, by change of the *modus operandi*, into a "Patent Hydraulic Slip." It is not my intention to discuss these matters now. Others have perfected them, and they derive the credit for successful perfection of inventions suffered to die by official ignorance.

In the year 1815, Mr. Walters, then architect to the India House, published a small pamphlet "On the Rendering Ships for Mercantile Purposes Unsinkable," and he proposed to effect his object by introducing copper cylinders between the timbers, the hold beams, and indeed every opening where cargo did not press, and he calculated that these displacements, or cells, would about compensate for difference of specific gravity between cargo, vessel and gear, so as to simply reduce her to the state of a water-logged craft, to save crew and vessel and such portions of cargo as might be secured in air-tight vessels.

The pneumatic trough then presented to my mind the propriety of close ceiling the holds, of under planking the hold beams, and saving those spaces between them for the stowage of light dry goods above that deck, which was generally lost, and placing loose planks (indeed, as we were in the habit of hatching many of our brigs of 386 tons, and under) as a temporary deck.

Now in the event of a dangerous leak, or even a large hole being stove in the bows or bottom of a ship, I proposed securing the hatches from beneath to hatches above, screwed firmly in opposition to each other, and filled in by pitch from the upper or open hatch.

Now, it will be apparent that if the ship was air-tight the water could only enter so long as the air was compressible, and by inverting the pump boxes, and rendering them air-pumps, the leak would not only be stopped, but, by the continued action of the air, the water would be expelled by the very orifice by which it entered. Therefore, the customary and continued labour and wear of the powers of the crew would not be required to such an extent, if at all, when once the necessary quantity of air had been forced in. And it is important here to comprehend the beautiful power afforded by the pneumatic principle of causing the air to be set free at the lowest point accessible, as in the pump well, and without further strain on the pump displacing the water.

Indeed, I proposed, in 1823-4, at Bermuda, where they were constructing naval docks without a rise of more than three feet of tide, to construct such a timber "camel" in compartments so that the crew of a ship should, by their lungs alone, lift their vessel out of water, repair her copper, replace her, and start on a fresh cruise in 48 hours or less. And on a late occasion, when I was consulted by Mr. Marryat, Chairman of the London Dock Company, as to the value of one of these lifting caissons, I proved to the parties, I hope satisfactorily, that by aid of a glass tube about three feet long, and half inch bore, I could, by my lungs, even at my age, effect the very same displacement which they obtained by machinery. But allow me to observe it was not with any object of proposing any such mode of action, but simply to prove that I was not only competent to give an opinion on the merits of the matter at issue, but that it was really a great great grandchild, the issue of my own brain.

All these matters now referred to were laid before my friends Sir Robert Seppings, Sir Byam Martin, Sir Henry Hotham, and Sir George Cockburn in 1818, with guns, rudders, anchors, &c., but I was too young to deserve attention, and Sir Robert Seppings declared that unless the vessel was built for the purpose she would blow up by the pressure.

But now we have arrived at the means, by the use of iron plates, of forming air-tight cellular vessels; and I hope to be able to show, that by pursuing my mode of construction, the vessel not only becomes very much less liable to injury by a ram, but, if carefully and scientifically fitted, she may be overrun by an adversary, come up the other side, and perhaps return the compliment.

I have used the term, "my mode of construction." I claim the introduction into the navy of the air-tight compartments. I was appointed, December, 1835 (at the instigation of Sir W. Symonds), to Chatham Dockyard to superintend the fitting of the *Erebus* and *Terror* for Arctic service, having fitted my former ship, the *Ætna*, under *carte blanche*, at Portsmouth, in 1830. Mr. Rice was foreman afloat under my direction, and Sir James Gordon, now living, can inform you that every plan of mine was carried out totally at variance with the views of that gentleman.

The *Terror* afterwards lost her sternpost, the after section filled, but she was brought to England, saved alone by that after water-tight compartment. Mr. Rice, however, received the credit, because he belonged as a civilian assistant to a yard having a principal builder.

But this idea of cellular construction did not first occur to me then. It had long been a pet scheme. I had

witnessed the facility of having the bottom open by my constant visits to the lobster smacks, in 1815, off the coast of Cornwall. I had closely watched the great junks of China in 1827, where each merchant carries his venture in his own water-tight cell, and when adequate powers were intrusted to me in 1830, I determined—then deemed a new application, if not an invention—to "well out" any hole which might be made by striking on rocks, and thus care nothing for the aperture. And for this purpose Mr. Blake, foreman afloat, similarly attached to me as Mr. Rice was in 1835-6, had made for me elongated "bringing-to bolts," with extra washers, as well as screw and nut bolts, all of which bore his name, as did also the "patent fid," then constructed for my decked boats, from my drawings, as made for me at Halifax in 1822.

It may not be generally known to builders how I proposed acting, but had the plan been followed in H.M.S. *Raleigh*, that vessel could very easily have been saved to the navy.

The facility of working by screw bolts under water, is sufficiently known to those who have had to deal with such matters, but there are secrets in all trades, and without the tact, talent is at a discount.

It is simply necessary to estimate or compute the internal form with which every builder is conversant, the approximate curves of the position where the injury lies, and to construct (either separately as a trunk, or placed piece by piece around the aperture, adding tarred felt), such a walling as will confine the water within limits. This may be either screwed down piece by piece if the ship's bow is well up on sand, or rocks, or may be forced down and shored from the beams until the ship is pumped out, when the outer walling can be perfected. But there is this difficulty in dealing with screws, bolts, or augers, under water; you cannot drive or screw to any certain effect under water. But having the command of a forge you can put on additional lengths to your tools with breaking nicks, which will easily separate on the attempt to bend, and thus work out of water.

We will now come to the question of rendering our steamers less liable to be sent to the bottom by sudden influx of water, by shot holes, or by any ram force which may make large apertures.

My first ideas on this subject arose in 1852, when considering the effect of a nip by the ice. We were then at sea, and beyond the refitting demanded for any such change, but my resolution was formed, and complete drawings made, entirely upsetting all previous ideas of cabin accommodation and stowage—unnecessary now—in fact, the construction of a ship within a ship. The outer sectional compartments each independent *per se*, for coals or stores. The inner, the steam compartment and accommodation, if necessary, demanded for the crew. The internal oval form would secure the means of withstanding externally any compression. It would facilitate the delivery of coals from the bunkers, and if anyone of those bunkers was perforated, or stove, you possess the engine power to be exerted from within of expelling the water by forcing in air, making every such valve self-acting from the exterior.

Now, many of us are practically aware of the facility of working under water within the diving-bell, and we have only to view the operation of closing a shot-hole under water as a diving bell mode of proceeding, taking proper care to secure the compartment which is fractured for such an operation.

But if we look carefully to the question which would be involved in action, I think we have no reason to believe that any volume of water admitted, *pro tem.*, into coal-bunkers, secured as I have suggested, would prove of any importance, seeing that the loose coal-dust would, immediately on becoming wet, fall down and fill up the space. Sothat, in fact, we should only have the difference between the specific gravity of coal and that of water as the increment of weight. And supposing the coal to be solid, and water inadmissible, we should merely change the weight

From	64·4	sea-water
To...	79·15	sea-coal
	14·75	

So that, truly, by a perfect system of compartments, we should laugh at shot-holes or rams, in so far as the duration of an engagement was concerned.

Now, looking to our timber-built vessels, I see no difficulty, particularly if they are swift, and of the *Alabama* breed, to the adaptation of these interior steam chests. We know full well to what angle we can heel these vessels, to clean their copper. Indeed, instead of heeling, which is dangerous, I would advise inclining by purchase, either by another vessel or by rafts, which I have practised, and which does not interfere with stowage. We will say as far as 30 degrees inclination, and at the corresponding line of flotation there, I would propose a firm stringer of African oak, well covered with asphalt, dividing any iron-sheathing from the copper bottom, and thus retaining the smooth and clean copper for velocity.

Now, we should refer to the state of our navy about the year 1824. At that period we commenced the system of Sir H. Davy, for preserving the copper from incrustation by marine mollusca, keeping up galvanic action to such a degree that they could not affix themselves to the copper. The ship I served in (the *Blossom*) was, in 1824, so fitted, with iron plates under each fore and mizen channel, about three feet below water. She continued in the Pacific, from the Arctic Circle to the Equator, four years, or until October, 1829, and was generally very free from weeds, except on the iron protectors, which were very soon reduced to plumbago, brittle, scaling off, and carrying with the incrustation of oxide masses of weed. Now, surely, at the present day, we are sufficiently advanced in science to secure the iron from coming in contact with the copper sheathing. The copper will not suffer, and it will be merely the nearest iron to it which stands a chance of being vitiated by its proximity to a dangerous companion.

From this stringer upwards, the vessel may be plated sufficiently to withstand guns of small calibre, or to deflect long-range shells, but, I would urge, not higher than the same lines of immersion, on the inclination due to 30 degrees. We should thus possess a hull which would be nearly unsinkable, and on that structure we might determine, as experiment may dictate, to use either square or round towers, but the bases of any gun-platforms should be so far retained within the limit of inclination as to set at nought any chances of such an absurdity as Capt. Coles exhibits in the plates of his pamphlet, in his *Favorite*. And assuming that a ship of war is engaged to leeward, considering also that our guns are not calculated to elevate 15 degrees, I do not think his arguments fair upon his land opponent. Besides, I would ask, what scientific officer, who understood his work, would so absurdly throw away his shot, when the weather-roll might in a few minutes reverse the conditions, exposing the interior of his tower to the mercy of his opponent. We hope yet to see a more satisfactory proof than assertion that the rolling of a turret vessel will not be dangerous to herself.

I have my own ideas as to the pendulum, as to the balance weights we have employed to equipoise our barometer—as to the steady chronometer table and the adjustments of chronometer escapements, not forgetting the governor in our land steam engines; and I expect the result of trial will prove that by so far as the turret inclines from the perpendicular, so will its weight be transferred to the lee-side. If the power of the hull be of sufficient (or possess surplus) buoyancy, then a result not to be wished must be elicited, the quick opposite or rolling motion to windward also due to the pendulum.

It is on this principle that we wing up our ballast to prevent quick rolling, endangering the masts. If we accord to the central weight what is advanced, why do we not in a gale of wind secure the guns amidships? When the roll is slow, long, and very deep, we do reduce the counterpoise by running in and housing main deck guns. The proposition reads to me like overmasting or carrying the leverage too high up.

Instead of wood filling, I would suggest the introduction of asphalt refuse, tough, resisting, and uninflammable, even under red-hot iron bolts. The principles advocated here are, first, cubical division, or the tank compartment, and of sufficient strength to resist pressure if used on the diving-bell system.

Next, the separation of the internal oval space to contain the engines, boilers, &c., and this alone, if securely circled, would, even if riddled, suffice to keep the vessel afloat, indeed, not disable her in any manner from continuing the engagement, which is the simple desideratum, for, like the exhausted prize-fighter, rest may recover, as withdrawal from action would enable our vessel quickly to repair or obviate damages.

I have now submitted to you the means by which timber built vessels may be enabled to fight a fair action even against plated vessels; and, provided they possess velocity, may even come out of action victorious, for we can advance many instances where a pair even of heavy guns well served in a vessel judiciously handled, are more than a match for superiority in broadside force.

It now only remains for me to make a few closing observations on a system of moveable armour, which may be adapted as a further protection to these vessels—which may be carried to a foreign station, or long voyage, in the hold, and when war is declared may be put on as occasion may demand.

It is proposed simply to arm the sides, for the prevention of penetration, from 20 degrees below the water-line, by similar plates to those now in use.

At the water-line, to bring on a set of powerful stringers or mouldings 7 feet asunder, admitting of armour plates dropping in from above, adapted with shoulders, so that the insertion of the second series would virtually lock them in their places.

Such a disposition would permit of any wounded plate being easily replaced; of any portion or all being removed and stowed in the holds, or, in peace, landed at the dockyard on a foreign station.

But this mode of moveable armour offers this further advantage in stationary guard ships should defence be demanded at moorings, for it is palpable to the plainest understanding that another tier of guns or masked battery, *à fleur d'eau*, would be available on the lower deck even of a sea-going vessel compelled to stand action in port.

Lastly, as regards facing our sea batteries. I maintain that by surrounding the outer masonry with a proper cage or framework, dropping in cylinders of 10 or 12 inch iron, and filling the interior up to the masonry with earth or sand, we have a much more economical as well as efficient casing than any masses of plating, which by their weight and concussion alone in action, would tend materially to assist in destroying the work they were intended to protect.

These observations are offered to the engineering body by one whose life has been passed in the active pursuit of ship-building, and, on several occasions, in superintendence of work in our public dockyards, indeed, of a positive workman for the last fifty years.

They result, too, from foreseeing many serious difficulties presenting themselves to the repairs of iron-plated ships, indeed, of the positive impossibility of meeting with adequate resources on board the fleet, or in any foreign British dockyard. The serious question is not how, or how fast to build, but where to secure the remedy for disaster.

Thanking you for your kindness in suffering me to occupy so much valuable time, I leave these knotty points for more skilled minds to digest.

SOUTH STAFFORDSHIRE ASSOCIATION FOR PROMOTING ADULT EDUCATION.

The fourth annual meeting and conference of the above Association was held on the 28th Septenber, at West Bromwich, under the presidency of Lord Lyttelton. The annual business meeting was held at twelve o'clock, at the rooms of the Christian Institute, High-street. There were present Sir Thomas Phillips, Vice-President of the Society of Arts; Mr. Sampson Lloyd, of Wednesbury; Mr. B. Blake, of Yorkshire; Rev. H. Solly, Secretary to the Working Men's Club Union, London; Rev. D. Melville, Vice-President of the Worcestershire Union of Institutes; Rev. Mr. Wall, Brewood; Rev. H. K. Sandford, and the following delegates:—Mr. Joseph Stokes and Mr. George Lewis, Dudley Mechanics' Institute; Messrs. Phillips and Mills, Wolverhampton Christian Institute; Mr. Jeffries, Stourbridge Associated Institute; Rev. H. Sherrard and Mr. J. W. Grier, Stourbridge Church of England Association; Messrs. Morris and Hicklin, Stourbridge Iron-works Institute; Mr. Thomas Wood and Mr. Coddington, the Lye Institute; Rev. George Wharton and Mr. Thomas Bolton, Kinver Improvement Society; Mr. H. Beckett and Mr. E. Hollier, Dudley Geological Society; Mr. C. Britten, Wednesbury Mechanics' Institute; Messrs. Chapell and J. C. Tildesley, Willenhall Literary Institute; Rev. J. Whewell and Mr. Murray, West Bromwich Christian Institute; Mr. F. Talbot, Messrs. Chance's Reading-room and Library; Rev. H. F. Newbolt and Mr. Edward Pugh, Bilston Institute; Rev. A. C. Hodd and Mr. John Hague, Bilston Working Men's Association; Mr. N. Beddall, Brierley-hill Working Men's Club; Mr. Hayward, Oldbury Literary and Discussion Society; Rev. J. H. Thompson, Cradley Literary and Scientific Society; Messrs. F. C. Horton, A. Jordan, and J. W. Grier, delegates from night schools. Revs. G. D. Boyle, Handsworth; C. W. Richards, Ettingshall; N. N. Solari, Ocker Hill; T. G. Simcox, Smethwick; Messrs. Sampson Lloyd, J. Solly, J. P. Hunt, George Thompson, &c., and Mr. J. A. Langford, of the Birmingham Working Men's Club, were also amongst those present.

The fourth annual report of the committee was read, and in it the committee congratulated the meeting upon the success of the operations during the past year. The object of the society was expressed in its title; but it was explained that as the committee did not regard education as being complete with the acquirement of information, such subjects as entertainments and systematic recreation for the people, the improvement of workmen's homes and the establishment of free libraries, local museums, and so forth, came very properly within the scope of the society's operations. The results of the operations of the society were to a considerable extent indirectly attained, and could therefore scarcely be fully estimated from the evidence afforded by bare statistics; but nevertheless, if the state of the classes and night schools three years ago was contrasted with what it was at present, it would be evident that a great advance had been made. The number of Institutions was nearly the same, but there was now much greater activity shown by managers, and much more real work done by them. Night schools and evening classes had increased in a remarkable manner, and were now more generally conducted in a systematic way, very often under professional teachers. The number of persons attending the examinations of the Association had also continued to increase each year. The proportion of working men belonging to the Institutions was now much greater, and in many places successful efforts were being made to provide special buildings for the purposes of Institution work. By returns received from seventeen Institutions, it appeared that the number of members in the societies was 2,296, and in nearly every case an increase was reported since last year. The number of books in the libraries of sixteen institutions was 11,363, and nine Institutions had 482 students in their various classes last winter. Those returns did not include several schools which paid the

Institution fee in order to be able to send candidates to the Society of Arts Examination. Eighty lectures were delivered during the year in connection with sixteen Institutions. The special features in the Institutions' work were this year numerous and important. A handsome and commodious building was in course of erection at Dudley, and would be completed in a few months. It contained on the ground floor a reading-room, club-room, library, laboratory, a public hall capable of accommodating a thousand people, and upstairs a minor lecture-room (to be used also as a night school-room), several class-rooms and a room for a museum, which would contain a collection of district minerals and fossil remains. The total cost of the building would be about £5,000. The managers had purchased at Willenhall a plot of ground, upon which a building comprising the usual rooms and a large public hall would be forthwith erected. The committee considered it of great importance that suitable and permanent accommodation should be provided for Institution work, and expressed their belief that many failures were caused by the meagre arrangements which were often thought good enough for members. In several places considerable attention had been paid to weekly entertainments of a varied and lively character, the charge for admission being generally about one penny. In every case these entertainments had been successful, and in some instances large sums of money had been realised. The programmes consisted of vocal and instrumental music, interspersed with readings from standard authors, addresses, and any special performances, in which amateurs could be induced to take part. These entertainments were exceedingly popular, especially with the working-classes; and since mere lectures were usually very poorly supported, and often resulted in loss to the Institutions, it seemed to the committee to be desirable that entertainments of the character of those first spoken of should be more extensively tried. The Wednesbury Mechanics' Institute, the Lye Institution, and the Bilston Working Men's Association, were the only Institutions that carried on these entertainments systematically. In Wolverhampton and Oldbury special committees did the work. The committee lamented that the attendance-lists of many of the classes showed little zeal on the part of the students; but alluded with satisfaction to the Wolverhampton Working Men's College as an establishment in which existed a spirit and unity that were very generally wanting in other Institutions. At Dudley, Stourbridge, and Wednesbury Mechanics' Institutions, and at West Bromwich Young Men's Christian Institute, elementary classes were held last winter. From the experience of the Dudley Institute, it appeared that fees of twopence and threepence per week, supplemented by a special annual subscription, were sufficient to secure the services of an efficient master, and two junior teachers, all paid. In Lancashire and Yorkshire elementary evening classes formed a general feature in the majority of Institutions, and were in most cases very nearly self-supporting; but in South Staffordshire there was a backwardness on the part of managers to make such classes a part of the regular Institute work.—The report contained some suggestions upon the subject of the management of night schools; and, upon the subject of science classes, said it was peculiarly desirable that their number should be increased in South Staffordshire, on account of the character of the prevailing industries of that district. There was every reason to believe that the number of such classes and of students would increase largely during the winter. In connection with this subject, the committee gladly noticed the establishment of a scientific society in the district, the object of the promoters being to popularise such branches of science as geology, botany, and chemistry. The subject of working men's clubs had occupied the attention of the committee. In January last they made arrangements for the secretary of the London Working Men's Club Union visiting various places in the district, in company with the Secretary to the Association, and meetings were accordingly held at Dudley, Stourbridge, West Bromwich, and Wolverhampton. Since that time, the Secretary had attended meetings on the same subject at Wednesbury, West Bromwich, Sedgley, Brierley-hill, and Pensnett, in all of which places working men's clubs were now in existence. The committee expressed their sense of the great assistance which the Central Club Union afforded in the organisation of working men's clubs. The number of candidates whose names were given in for night schools this year was 300, and of these 210 were afterwards examined at 12 centres. Eighty-eight candidates for the Society of Arts certificates, and 58 for the prizes offered by the Science and Art Department had also been examined. The increase of candidates since 1862 was 54. During this year the committee had undertaken the superintendence of the Cambridge local examinations, held at Wolverhampton, with a view of bringing all the educational work of South Staffordshire into one focus. In December last, 39 candidates were examined at Wolverhampton — four from the senior examination and thirty-five of the junior. In the list of successful candidates South Staffordshire maintained the same high position which it occupied the preceding year. Several were distinguished in the classes and in separate subjects; and the Prince Albert Memorial Scholarship, the highest honour connected with the examinations, was won by a scholar of this district. The report concluded with an expression of regret that the Rev. J. P. Norris and the Rev. H. R. Sandford, having left the district, the association was deprived of their valuable assistance. It was also said that "the circumstances under which the committee were deprived of the aid of the late Rev. Mr. Campbell, and the sad fate which befel both himself and family only a short time ago, invest with peculiar interest the remembrance of the kind and genial friend who so recently took an active part in the work of the association." From the treasurer's account it appeared that the total income of the association during the past year had been £226 4s. 6d., and the expenditure £230 9s. 8½d. The balance of £33 18s. 4d. due to the treasurer last year had since been reduced to £20 12s. 3d. The committee appealed to the public for aid to pay off this debt, and to defray current expenses. The report was approved.

The Rev. H. Solly said that the members of the London Institutes felt very grateful for the assistance given them by the South Staffordshire Association, and by Mr. Jones, the secretary.—The report of the Examiners and that of the Visitors were then read. From the former it appeared that, although the number of candidates for night schools had increased considerably, the quality of the work done had deteriorated. The number of failures to pass the examinations was 15 per cent. higher than last year. The answers to Scripture questions showed a fair knowledge of the subject; there was nothing calling for special note in arithmetic; the English grammar papers were not satisfactory; about half the papers in composition were "fair, though scanty;" the writing from dictation was in most cases correct; with two or three exceptions, the papers in English history were very unsatisfactory. One of the examiners strongly recommended the managers of schools to allow no youth to study any other subject for examination until he was thoroughly grounded in spelling and English grammar by means of dictation, parsing, &c. He doubted, in fact, whether it was advisable to allow any other subject to be offered to the candidate till he had passed an examination in reading, writing, and arithmetic. From the visitors' report it appeared that nineteen night schools were connected with the union, and that the number of persons attending them was 1,052.—After the approval of the reports, and a few observations having been made upon them, votes of thanks were passed to Lord Lyttelton, president; Mr. J. R. Chance, treasurer; by the Rev. Mr. Newbolt, and others. Lord Lyttelton was requested to continue to fill the office of president during the ensuing year, and his lordship consented to do so.—Mr. Stokes moved that action be

taken to obtain exemption of Institution buildings from taxation. He said that as the law stood at present literary and scientific societies were exempt from taxation, except in certain cases, but the exceptions were such that the moment the societies became useful they were liable to be taxed. If any person resided on the premises, if payment was received for instruction, if payment was received for admission to lectures, in either of these cases the societies were liable to taxation. He commented upon the absurdity of taxing an Institution that would otherwise be exempt merely because some person remained on the premises to take care of the valuable property upon them, and said it was impossible to educate the people without receiving small payments both for class instruction and for admission to lectures.—Lord Lyttelton said he was not before aware of the existence of the exemptions spoken of by Mr. Stokes, but now that they were made known to him it certainly appeared that the intentions of the legislature were nullified by them. It must be borne in mind, however, that there was doubtless something to be said in favour of them or they would not have been made. He suggested that a deputation should be appointed to wait upon the Chancellor of the Exchequer. It was then resolved that the Association should take measures for obtaining exemption.—The Rev. Mr. Sandford moved that in future, as the Society of Arts did not examine in Scripture, a prize be offered by the South Staffordshire Association for the Promotion of Adult Education, to Society of Arts candidates, for proficiency in this branch of knowledge—the result of examination not to affect the candidate in his examination by the Society of Arts.—The motion was agreed to.

At half-past two an Educational Conference was held, and a number of subjects were discussed, amongst which was the subject of "Working Men's Clubs—how far they have been successfully tried in this district, and their adaptation to the necessities of the class for which they are intended."—The Rev. H. Solly, Secretary of the Working Men's Club Union, London, was the first speaker. He said it was hoped that working men's clubs would have the effect of attracting men at length to Mechanics' Institutes and working men's colleges. They were intended to be common grounds upon which working men could meet their friends and amuse themselves, and where they could improve their minds by study. At present if they wanted to see their friends they had no place to go to but to public-houses, and there they had to pay heavily, and become demoralised. Friendly and other societies now meeting at public-houses actually were put to so great an expense as 25 per cent. of their whole expenditure, on account of meeting at public-houses.—The Rev. George Boyle, of Handsworth, gave a very satisfactory account of the experience he had had in his parish.—The Rev. Mr. Sandford, in the course of a few observations, spoke of the admission of young men to working men's clubs, and said it was found to be injurious to the club to admit them.—The Rev. H. Solly said he knew that several clubs entirely failed on account of admitting young men.—Mr. J. A. Langford gave an account of the Working Men's Club in Newhall-street, Birmingham, and said the object of the Committee was to obtain light, warmth, and cheerfulness. As to the subject of beer, they did not mention it at all, but did not introduce it, and they thereby got over a great difficulty. It was found that twopence per week from each member, with the profits accruing from the sale of refreshments, was sufficient to pay all expenses. 500 cups of tea and coffee were sometimes sold in an evening, and the club was doing a great amount of good. It was expected that there would, in a short time, be three other clubs in Birmingham, each with 500 members. A piano was about to be introduced, the Mayor of Birmingham having already given a donation of £20 towards the purchase of it. —The Rev. D. Melville moved, "That in the opinion of this Conference the movement establishing working men's clubs and institutes deserves the cordial support of all classes, and it is trusted that the friends of education, as well as of the moral elevation and happiness of the working classes in this district, will endeavour to assist in their formation and establishment."—Mr. Sampson Lloyd seconded the motion, and it was agreed to.—Mr. Barnett Blake, Yorkshire Union of Institutes, feared that working men's clubs would decline as soon as they ceased to be a novelty. He feared they would not be self-supporting, and if they were not they would be a failure. He commended the course taken by the Birmingham committee in not mentioning beer or spirits at all in connection with the club. The majority of working men would not expect beer or spirits at their clubs if they were not suggested to them; but the absolute prohibition of them awakened that principle of perversity which has so much to do in swaying the human mind under certain circumstances.—The Chairman (Lord Lyttelton) said he quite agreed with Mr. Blake, that unless working men's clubs were self-supporting they would be failures—that was, self-supporting as to their ordinary current expenditure. It was quite right and proper that in every neighbourhood the little capital necessary for starting should be provided by the wealthier classes; but if anything beyond this was required, it could only be because the clubs were not in demand by the working classes. It was a great mistake to lay down a positive restriction of intoxicating liquors; in his opinion this was unfair treatment of the working classes. That they should not have their beer or whatever they wanted was what no one had a right to say to them, unless it were in accordance with the feeling of the best judging and most reasonable amongst the working classes themselves. He entirely approved of the working classes laying the restriction on themselves, and should be rejoiced to know that they did so, and admitted that it was quite expedient that they should be advised to do so. But what was it but a sign of the inferiority of the working classes to forbid them to have their spirits or beer? The publicans on the whole were the enemies of the working man—that could not be denied, and, generally speaking, they were very great nuisances to the working classes. This was often enough proclaimed; but why did not people say that the hotels of the upper classes, and the houses of entertainment of the middle classes were nuisances? He believed it might have been said with truth years ago; but nobody ever hinted now that hotels were nuisances to the morals of the middle classes. As we had seen an improvement in these respects in the upper and middle classes, so we should, he hoped, soon see a corresponding improvement in the lower classes. He never should be content till he saw that improvement, and until the time when the working classes could be trusted. One of the speakers had mentioned that some members wished to dance at a certain working men's club. There was no reason why the fact should be concealed that the Working Men's Institution at Worcester failed, after a certain number of years, because of the scandal caused by its weekly dancing meetings. When the working men could not be trusted to hold such meetings, it was a sign that they were inferior in the matter of self-control. Unless it was said that dancing was essentially evil, the prohibition of it to the one class, whilst it was permitted to another, showed that the one class was considered inferior to the other in morality, self-respect, and self-control. It was questioned whether smoking ought to be allowed in working men's clubs, and whether it should be permitted in the common room or be confined to a smoking-room. Now he (Lord Lyttelton) might be said to be biased upon this subject, for he had, personally, a great dislike to smoking, but in this case he thought all that was necessary was to avoid excess, which was doubtless highly injurious. The general principles upon which working men's clubs were advocated and founded he entirely approved of, and he hoped that those who had the conduct of the clubs would try with the utmost care and vigilance to conduct them wisely.

Papers were read upon the subjects of "Penny Entertainments and Cheap Concerts," and "Night Schools."

There was not time to discuss the subject of "Science Classes," which was on the paper. At five o'clock the President and Delegates, and others present, dined at the Dartmouth Hotel; at six o'clock the night school candidates had tea in St. George's Hall; and, at half-past-six there was a *soirée* and general meeting in the St. George's Hall, in connection with the Young Men's Christian Institution.

Lord Lyttelton, the President, at half-past 7 o'clock, went to St. George's Hall, in company with a number of the clergymen and gentlemen who were present at the meeting in the morning; and having taken the chair, he delivered an address to the ladies and gentlemen present, who were so numerous as to fill the hall both on the floor and in the galleries. His lordship said he rejoiced there were a large number of certificates and other prizes to be distributed. He should have very considerable pleasure in giving away those prizes and certificates. They represented a large increase in the work of the Association. The distribution of prizes would alone occupy a great deal of the time of the meeting, so that in the observations which he was about to make he should not dwell upon any general principles connected with Associations of that kind, but he should have to notice some particular events connected with the Association during the past year. There had been events in connection with the Institution which were of a highly-favourable and gratifying character; and if he dwelt for a moment upon one of a very different kind, it was because it was better, upon an occasion like this, to get a subject of melancholy reflection out of the way, to leave space for the business that it was necessary to transact during the evening. In the first place he wished to advert to a heavy loss which the Association had sustained during the past year. There was not one connected with the South Staffordshire Association for Promoting Adult Education, and more especially was there not one upon the committee of that Association, who would not deeply regret the death, in New Zealand, of one of the most faithful and assiduous members of the committee, the Rev. Mr. Campbell, late of the Endowed School of Wolverhampton, in which town he was known and respected for many years before he was connected with the South Staffordshire Association. He could not but advert to this subject, as it was one which was uppermost in his mind, as he was sure it was in that of everyone connected with the Association. The tenets of religion only were capable of imparting any degree of satisfaction under such melancholy circumstances. He was glad of the opportunity thus incidentally afforded him to speak of religion in connection with that Institution. There could be no greater mistake than to suppose that because the conduct of that institute and that of similar ones had no direct connection, practically speaking, with religion, the subject ought to be totally excluded from view on an occasion like that. None of them, he was very certain would consent to have to do with the affairs of an institu-, tion which excluded the concerns of religion, even though it was excluded on account of the peculiar circumstances of the country, unless they were allowed to take it into account when looking at affairs in a comprehensive way. The direct concerns of religion were necessarily excluded because all classes were to be included; and there was necessarily a very great difference of opinion upon the subject of religion, and there was in the mind of every one a most earnest adhesion to his own form of belief. Therefore it was inevitable either that the institution must fail or that it must exclude all direct reference to religion. It was desirable on all proper occasions to show that institutions of that kind were in danger of arrogating to themselves more than they ought to do. They were in danger of supposing that they were to undertake in a full and complete sense the conduct of the moral and social progress of those with whom they had to deal, whereas they ought to consider that they were to act rather as handmaids than as leading powers, and to bring up those committed to their care to that state of enlightenment and understanding and right feeling in which they would be most susceptible of the higher influences of religion. Many things were needful for the welfare of the mind, but the communication of religious knowledge was the most important of all, and the danger was that that would be neglected. That was the only point of a general nature upon which he (Lord Lyttelton) wished to touch that evening. He trusted that the ministers of religion of all denominations whose co-operation the Association had the advantage of having, would never lose sight of the important matter to which he alluded. He did not speak with indifference of the religious distinctions amongst them. If they could be regarded with indifference, they ought not to exist; but as against ignorance, vice, and evil, the exertions of every Christian minister were welcome. He hoped the managers of the Association would, without hesitation, adhere to that one practical principle, to which he believed the institution owed whatever measure of success it had had. The most powerful instrument by which the objects and intentions of the association might be made known through the district was a living agent—a man whose main business should be to make known the existence and objects of the association, and to bring up to the level of its operations the population with which the society had to deal. Such an agent was obtained by the appointment of a gentlemen who was first known as organizing agent, who was now known as secretary, and who was looked to as the right hand of the Association. He did not intend to dilate upon the personal merits of Mr. Jones; he was thinking more of the principle upon which the appointment was made. He should not, however, for a moment make light of the eminent merits and qualifications which he believed Mr. Jones possessed for his office; he was satisfied that a better appointment could not have been made. An officer in the position of Mr. Jones must always be the mainstay of such an association. He had only to say of the report that, with one single and important exception, it was of a satisfactory and gratifying character. It was not to be doubted that, in many of the night schools of the district, much progress had been made; but yet, in the impartial report of the examiners a feeling of dissatisfaction and disappointment was expressed. But this ought not to discourage them; for he believed that the shortcomings of the night school candidates for certificates were due to the eagerness of the candidates and of the teachers to distinguish themselves. In the results of the examinations for the Society of Arts prizes; in the number of institutes which had joined the Union; in the number of candidates, and in the general extension, numerically speaking, of the operations of the society over the whole district, the report would show an increase and an improvement; and if so he should feel sanguine as to the good which institutions of that kind would effect. The progress might be slow, and might not be perceived at once, nor in quiet times; but in a crisis it would be more apparent than if it could be tested and gauged from year to year. It was an improvement of this kind, so slow that it was not perceived, that had resulted in the incomparable conduct of the suffering people of the North of England in their recent distress. Such conduct as theirs would have been unthought of under such circumstances 40 or 50 years ago; and who could doubt that the knowledge they had obtained, and the intellectual training they had undergone, imperfect as they were, had had a great part to play along with other and even higher influences, in producing that remarkable improvement in their conduct? In that district (South Staffordshire), a great improvement was visible. The people were more ready to avail themselves of opportunities for intellectual cultivation and moral improvement. In these respects the association felt comfort and satisfaction in looking back at what had been done and forward to what they hoped to do. His lordship concluded with a eulogy upon the Society of Arts, hoping that it would for a long time perform to a great extent for the middle classes the same func-

tions which were performed for the higher classes by the two ancient and other universities. The South Staffordshire Association intended therefore to maintain and strengthen its connection with the Society of Arts.—Mr. Robinson read an abstract from the report of the Christian Institute, West Bromwich. The object of this institute is to provide for the mental, moral, and spiritual condition of young men. It seeks to do this by means of the delivery of practical addresses on the great questions of life, by lectures, classes, and a carefully selected library. A large number of young men are connected with the Institute, and it is doing a great deal of good in West Bromwich.—A large number of prizes and certificates were then distributed by Lord Lyttelton amongst the successful Society of Arts candidates, and the successful candidates from night schools, evening classes, &c.—Sir Thomas Phillips moved a resolution to the effect that the continued experience of the operations of the South Staffordshire Association for the Promotion of Adult Education, having fully demonstrated its usefulness in promoting the efficiency of the various educational Institutions in union, it is deserving of that liberal amount of public support by which alone it can be maintained; and in the course of his address he alluded to the slow rate of mental and moral progress as a consoling fact for those who occasionally felt discouraged at the smallness of the results which they could see their work produce. He also gave various details about the Society of Arts examinations, and concluded by wishing every success to the Association.—Mr. James Chance seconded the resolution. He had once been rather doubtful whether there was need for such an Association as the one under whose auspices they had met; but those doubts had now been completely removed, and he most heartily commended the scheme to the support of the employers of labour in the district, in order that its usefulness might be still further extended.—Rev. H. Solly and Mr. Barnett Blake then addressed the meeting on working men's clubs and institution work, and after the usual thanks to the chairman, the proceedings terminated.

PATENT LAW AMENDMENT ACT.

Applications for Patents and Protection Allowed.

[*From Gazette, September 25th*, 1863.]

Dated 16th September, 1863.

2271. B. Latchford, Upper St. Martin's-lane—An improved spur.
2272. B. J. Webber, Newton Abbot, Devonshire—Imp. in threshing machines.
2273. R. Thomson, Manchester—An improved mixed fabric, and in the application thereof to covering umbrellas and parasols.
2274. E. Scott, Manchester, and J. Starkey, Salford—Certain imp. in looms for weaving.
2275. R. Harrington, Birmingham—Imp. in umbrellas and parasols, and in parts thereof.
2276. J. M. Tate, Bermondsey Wall, Bermondsey—An improved method of hanging the lower topsail yards of ships and other sailing vessels.

[*From Gazette, October 2nd*, 1863.]

Dated 5th June, 1863.

1401. A. Q. de Gromard, Paris—Imp. in musical instruments.

Dated 25th June, 1863.

1605. H. C. Lee, Lawrence Pountney-lane—Imp. in the construction of sewing machines. (A com.)

Dated 4th August, 1863.

1924. E. A. Cotelle, 29, Boulevart St. Martin, Paris—A new method of manufacturing gas alcohol by means of diluted acids acting indefinitely without re-concentration.

Dated 12th August, 1863.

1989. L. R. Bodmer, 2, Thavies-inn—An improved mode and apparatus for dressing and finishing and for imparting lustre to yarn and thread made of silk, cotton, and other fibrous substances. (A com.)
1995. R. S. Newall, Gateshead, Durham—Imp. in apparatus for serving ropes for ships' rigging and other purposes.

Dated 13th August, 1863.

1998. C. C. Dennett, Nottingham—An improved method of fire-proof construction for buildings by the use of arches formed of concrete.

Dated 15th August, 1863.

2030. J. Grantham, 31, Nicholas-lane, City—Imp. in apparatus for manufacturing salt.

Dated 24th August, 1863.

2091. H. Batt, 21, Charlton, King's-road, Kentish Town—Imp. in roughing horses without taking off the shoe.
2096. F. R. Stack, Belgrave-villa, Finchley—Imp. in the construction of military bridges, piers, landing stages, and escalading apparatus.

Dated 27th August, 1863.

2121. G. Richards, 2, Caroline-street, Bedford-square—Imp. in the construction of ordnance and fire-arms, and in the projectiles to be used therewith.

Dated 28th August, 1863.

2127. L. A. Mulet, 1, Rue St. Charles, in the Thernes, Paris—An improved method of shoeing horses, and covering the feet or hoofs of other domestic animals with hardened india-rubber, gutta percha, and other improved similar materials.

Dated 29th August, 1863.

2137. W. Whitworth and J. Wrigley, Sowerby-bridge, near Halifax—Imp. in or applicable to the furnaces of steam boilers.

Dated 2nd September, 1863.

2169. R. Sims, Leigh, Lancashire—Imp. in reaping and mowing machines.

Dated 3rd September, 1863.

2174. A. L. Durand, 10, Rue de la Fidelite, Paris—Certain imp. in in the manufacture of nails and other similar articles.

Dated 4th September, 1863.

2183. C. Thornhill, Sheffield—A new or improved method of adapting steel or other suitable metallic wire to be used instead of animal bristles or hair, in sewing boots, shoes, saddlery, and leather works generally.
2184. C. G. Kelvey and W. Holland, Rock Ferry, Cheshire—Imp. in the construction of chronometers and other time keepers.
2185. J. Hendry and W. Coutts, Aberdeen—Imp. in furnaces.

Dated 7th September, 1863.

2198. J. B. York, Coleshill, Warwickshire—Imp. in privies or closets to be used in place of water closets.

Dated 8th September, 1863.

2211. J. D. Jack, Montrose—Imp. in moulding or shaping metals.

Dated 9th September, 1863.

2214. J. Lille and J. H. White, Manchester—An improved composition or coating for the protection and preservation of surfaces of iron, wood, and other materials.
2215. W. H. Hawksworth, Oldham, Lancashire—Certain imp. in apparatus for preparing cotton and other fibrous materials for spinning.

Dated 10th September, 1863.

2229. J. H. Wilson, Liverpool—Imp. in side lights for ships and other navigable vessels, and in the manufacture of the same.

Dated 14th September, 1863.

2253. H. Riviere, 19, Queen's-road, Bayswater—Imp. in the construction and application of apparatus and implements used for the purposes of heating, cooling, and evaporating.
2256. W. E. Gedge, 11, Wellington-street, Strand—Imp. in safety lamps for mines. (A com.)

Dated 16th September, 1863.

2264. J. Fox, Derby—Imp. in machinery for planing or cutting off the sides of armour plates.
2265. A. Fleming, Glasgow—Imp. in cutting or finishing matting and similar fabrics, and in the machinery used therefor.
2266. G. Lewal, 5 and 6, Philpot-lane—An improved method of, and apparatus for, consuming smoke, and heating and warming public and other buildings, and for drying purposes generally.

Dated 17th September, 1863.

2277. J. McEwen, Lay's Foundry, near Brierley-hill, Staffordshire—A new or improved combined coke oven and hot blast oven or apparatus.
2278. Z. J. Mercier, 50, Rue de Longchamp, Chaillot, Paris—An improved gas cock of elastic and continuous pressure.
2279. W. E. Gedge, 11, Wellington-street, Strand—Improved instruments for ascertaining levels, also for computing angles. (A com.)
2281. A. Chaplin, 24, Cheyne-walk, Chelsea—Imp. in apparatus for propelling ships or vessels.
2282. P. Cowan, Barnes, Surrey—An imp. in refining sugar.
2283. F. De Wylde, Trinity-square, Tower-hill—Imp. in the manufacture of an hydrated silica.

2284. R. A. Brooman, 166, Fleet-street—Imp. in taps. (A com.)
2286. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in life belts and swimming belts. (A com.)
2287. P. McLaurin, Glasgow—Imp. in drying paper, pasteboard, and similar fabrics, and in the machinery, apparatus, or means employed therein.
2289. J. Whitehead, Calverley, near Leeds—Imp. in pneumatic motive power machinery.

Dated 18th September, 1863.

2290. J. Allen, Manchester—Imp. in the construction of valves and cocks for steam, water, gas, and other fluids.
2291. J. Roberts and R. Naylor, Manchester—Imp. in increasing, diminishing, or otherwise regulating the power and tone of organs, harmoniums, pianofortes, or other instruments with similar keys or keyboards.
2292. R. D. Dwyer, Warrington, Lancashire—Improved apparatus for cleaning and painting or coating the bottoms of ships and other structures.
2293. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in the manufacture of iron and steel, and in the apparatus to be employed in such manufacture. (A com.)
2294. W. Lorberg, Wyld's-rents, Bermondsey—Imp. in the treatment of rags, and obtaining valuable chemical products from the animal fibre therein.
2295. I. Baggs, Cambridge-terrace—Imp. in the means of protecting and preserving the hulls and bottoms of ships and vessels from fouling and corrosion.
2296. A. Noirot, 61, Rue Pigaile, Paris—New tiles.
2297. J. M. Cook, Leicester—Imp. in railway carriages and all other springed vehicles.
2298. R. A. Brooman, 166, Fleet-street—An improved thread for fishing nets. (A com.)
2299. H. W. Hart, Fleet-street.—An imp. in T fastenings.
2301. A. V. Newton, 66, Chancery-lane—An imp. in propelling vessels, and in apparatus relating thereto. (A com.)
2302. W. Smith, 19, Salisbury-street, Strand—Imp. in constructing breech-loading ordnance. (A com.)
2303. W. Smith, 19, Salisbury-street, Strand—Imp. in the construction and mode of working ordnance for ships and forts, and in the means of protecting those engaged in working guns employed for such purposes. (A com.)
2304. T. Small, Bargate, Boston, Lincolnshire—Imp. in motive-power machinery.
2305. V. Houghton, Grove House, West Reading—Imp. in lamps and lamp wicks. (Partly a com.)

Dated 19th September, 1863.

2307. J. Buckley, Lees, Yorkshire—Certain imp. in mules for spinning cotton and other fibrous substances.
2309. R. Couchman, Noble-street, St. Martin's-le-Grand—Imp. in articles or instruments for supporting, holding, or carrying parasols, bags, watches, ornaments, or other articles or appendages.
2310. C. L. Fleischmann, 18, Rue Moncey, Paris—Imp. in machinery or apparatus for ginning cotton, also for cleaning, opening, and preparing cotton, wool, and other fibrous substances.
2311. B. Davis, Brettle-lane, and W. Bowler, Wall-heath, Staffordshire—An improved mode of strengthening tilt hammers.
2312. J. C. Pooley, George-street, Bath—Imp. in brewing or preparing beverages from malt and hops.
2313. J. P. B. Le Paturel, Piette House, Guernsey—Imp. in breech-loading fire-arms.
2315. T. Richardson, Newcastle-upon-Tyne, J. J. Lundy, Leith, N.B., and R. Irvine, Magdalen Chemical Works, Midlothian—Imp. in the extraction or manufacture of oils from vegetable substances.
2316. H. Bateman, Castlenau, Barnes, Surrey—An improved construction of rotary engine.
2317. T. E. Vickers, Sheffield—An imp. in the manufacture of cast steel tyres. (A com.)

Dated 21st September, 1863.

2319. E. F. Battier, 82, Boulevart Sebastopol, Paris—Imp. in crinolines.
2321. W. B. Robins, Harborne, Staffordshire—Imp. in portable fire and garden engines.
2322. A. A. Downes, Stonnall, Staffordshire—Imp. in artificial teeth.
2323. E. Alcan, King-street—Imp. in shears for cutting metal threads, wires, and rods, applicable also for guaging wires. (A com.)
2324. E. Alcan, King-street—Imp. in condensers applicable to wool carding engines. (A com.)
2325. F. A. Chatel, 29, Boulevart St. Martin, Paris—Imp. in burners for burning all mineral oils. (Partly a com.)
2326. R. Wallis, Basingstoke—Imp. in apparatus for loading and unloading vessels, and raising, lowering, and otherwise conveying sacks, casks, agricultural produce and other objects from one locality to another.
2327. R. Ridley, Leeds, and J. G. Jones, Cumming-street, Pentonville—Imp. in apparatus for giving a reciprocating motion to picks and cutting tools used in getting coals and other minerals and stone.
2328. G. T. Bousfield, Loughborough-park, Brixton—Imp. in power looms for weaving hair cloth and fabrics in which the weft is inserted in separate lengths of material. (A com.)
2330. W. Hutchinson, 26, Rue Notre-Dame-des-Victoires, Paris—Imp. in machinery for manufacturing moulded articles of india rubber. (A com.)
2331. T. B. Daft, Harlesden, Middlesex—Imp. in the construction of ships and vessels, and in sheathing the same.
2332. W. A. V. Kanig, Bedford-place, Russell-square—Imp. in railway telegraphs and signals, and also in the permanent way and carriages, for preventing railway accidents.

Dated 22nd September, 1863.

2333. J. Renshaw and J. Haworth, Manchester—Imp. in machinery for stretching woven fabrics.
2335. P. Effertz, Manchester—Imp. in machinery or apparatus for making bricks, tiles, pipes, and other similar articles.
2336. C. Maitland, Alloa, Clackmannan, N.B.—Imp. in mashing apparatus.
2337. J. Bond and J. Bond, Longridge, near Preston—Imp. in brick and tile making machinery, applicable also to machinery for manufacturing other articles from plastic materials.
2339. J. Brigham and R. Bickerton, Berwick-on-Tweed—Imp. in reaping or mowing machines.

Dated 23rd September, 1863.

2340. W. Cleninson, Ashton-under-Lyne—Imp. in the construction of pipe wrenches.
2341. J. Platt, 33, Argyle-street, St. Pancras—Imp. in machinery applicable to steam and water engines (as motors), which machinery is also applicable to lift and force pumps.
2343. W. Galloway and J. Galloway, Manchester—Imp. in lubricating journals of revolving shafts and axles, and in the apparatus employed for that purpose.
2344. E. T. Hughes, 123, Chancery-lane—Imp. in gas condensers. (A com.)
2345. W. Gibbs, and J. Holland, Eccles, Lancashire—Imp. in looms for weaving.
2346. W. T. Eley, Gray's-inn road—Imp. in the manufacture or construction of ball cartridges.
2347. A. Collingridge, 82, Cheapside—Imp. in the manufacture of casks and other receptacles for containing oil, petroleum, and other liquids.
2348. J. Phillips, Tollington-road, Holloway—Imp. in the construction of levels, applicable to levelling, surveying, astronomical, nautical, and other instruments or purposes to which levels are applicable.

Patents Sealed.

[*From Gazette, October 2nd*, 1863.]

2nd October.

864. F. C. Bakewell.
865. B. Cooper.
870. J. Burwin.
872. J. Swinburne & J. Stanley.
874. A. C. Bamlett.
878. R. A. Brooman.
879. R. A. Brooman.
889. W. H. Mitchell.
890. J. L. Norton.
891. A. Kinder.
896. G. Spencer.
907. T. Baldwin.
908. S. Shelmerdine and J. Dransfield.
910. R. Smith.
916. J. Lockwood.
923. C. A. Collins.
925. J. Gill.
927. R. Leggett and R. Gittus.
942. J. Smith.
947. H. A. Bonneville.
948. A. Marriott.
953. T. B. E. Fletcher.
995. W. C. Cambridge.
1011. W. Clark.
1013. P. McGregor.
1034. J. Dunbar, jun., and J. W. Woodford.
1336. A. Poirrier and C. Chappat, jun.
1042. W. E. Newton.
1070. R. Butterworth.
1072. G. E. Donisthorpe.
1073. H. Y. D. Scott.
1085. H. W. Ripley.
1086. M. Henry.
1234. V. J. Cassaignes.
1264. P. Addington.
1425. W. E. Newton.
1454. C. L. Van Tenac.
1464. W. Sims.
1543. T. Smith, T. Moore, and M. Burrell.
1613. R. Mushet.
1701. G. Haseltine.
1748. J. Laing.
1846. M. Meisel.
1980. A. V. Newton.
1987. R. Mushet.
1988. J. Cornforth & A. Andrews.
2034. G. T. Bousfield.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, October 6th*, 1863.]

28th September.

2398. W. E. Newton.
2935. J. A. Fanshawe and J. A. Jacques.

29th September.

2469. G. T. Bousfield.

30th September.

2370. C. H. Hurst, H. Horsey, and G. Baker.

1st October.

2384. G. Rhodes and J. Syme.
2390. J. Bower and D. F. Bower.
2438. J. Calkin.

2nd October.

2397. J. W. Greaves.
2425. W. Yates.

3rd October.

2411. W. MacNaught.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, October 6th*, 1863.]

29th September.

2476. W. E. Newton.

3rd October.

2320. D. O. Boyd.

Journal of the Society of Arts.

FRIDAY, OCTOBER 16, 1863.

NOTICE TO MEMBERS.

The Council hereby convene a General Meeting of the members of this Society, to be held on Thursday, the Twenty-second of October, at four o'clock in the afternoon, at Burlington House, Piccadilly, for the following purposes :—

1st. To suspend, for this meeting, the Bye-laws relating to the election of members and officers.

2nd. To elect His Royal Highness the Prince of Wales a member of this Society.

3rd. To elect His Royal Highness the Prince of Wales President of this Society.

(By order)
P. LE NEVE FOSTER, *Secretary.*
Society's House, Adelphi, W.C.,
14th October, 1863.

MINING INDUSTRIES AND COAL TRADE OF BELGIUM.

All the mines, quarries, turbaries, fixed steam-engines, metal, glass, and alum works of Belgium are under the supervision of an Inspector-General and eight inspectors, all subordinate to the "Directeur-Général des Ponts et Chaussées et des Mines" in the Ministry of Public Works. They are divided into two directions and eight arrondissements, as follows :—Hainaut, having two arrondissements—Mons and Tournay; Charleroy; the other eight provinces, having six arrondissements—Namur, province of; Luxembourg, province; Liège, left bank; Liège, right bank; Huy; the five northern provinces.

There is, moreover, a body of five members, called "Conseil des Mines," invested with certain deliberative attributes, especially referring to concessions and extensions of mines.

The organisation and taxation of mines is mainly regulated by the laws of the 21st April, 1810, and 2nd May, 1837. All mining operations must be previously authorised by a Royal Act of Concession, which confers perpetual property in all deposits of any specified mineral within a certain defined area on the payment of certain dues to the owner of the land, as well as to the Treasury. The concession is always refused if the existence of the mineral is not proved to the satisfaction of the Council of Mines. If in the process of working another mineral should be discovered, a fresh concession must be applied for. This is generally, but not necessarily, granted to the same "concessionnaire." The tax on mines is divided into the "redevance fixe" and the "redevance proportionelle," the former amounting to 10 centimes per hectare (2·47 acres), the latter to $2\frac{1}{2}$ per cent. of the net produce. Both of these charges go to the Treasury. There are besides two similar charges which vary in different concessions, payable to the owners of the surface; a fixed charge, generally amounting to 1 franc per hectare, and a graduated rate of from 1 to 3 per cent. of the net produce.

There are 82 concessions of metallic mines, and 266 of coal mines, now in vigour. The 82 metallic concessions cover 45,000 hectares; they are worked at 1,256 different points, of which 121 are open-air excavations, and 1,135 are pits. The number of hands employed in all these conceded mines is 11,141. Besides these, about 6,000 or 8,000 are employed in the so-called "free iron mines," which are not included in the above figures. The 82 conceded mines are provided with 104 steam-engines, besides other mechanical appliances for extracting minerals and water.

The principal produce of all these mines are iron ore, pyrites, blende (sulphuret of zinc), calamine (carbonate of zinc), and galena (sulphuret of lead). The quantities of these five minerals raised in 1860 were 927,810 tons, valued at 13,500,000 francs. Besides these, there are certain unrecorded quantities of manganese, barytes, lead, and aluminous schist extracted. A certain quantity of copper is manufactured from imported ore, but none is extracted from the mines. Iron, zinc, and lead are virtually the only metals extracted in Belgium. The produce of the marble, stone, and slate quarries is 17,300,000 francs in value—greater than that of all the metallic mines together, and employs 17,105 hands. If this produce be added to that of the mines and metals, the aggregate wealth created from the mineral produce of the country, still exclusive of arms, machinery, and hardware, would appear as follows :—

	1851.	1859.	1860.
	Francs.	Francs.	Francs.
Metallic Ores	8,078,292	14,061,737	13,576,202
Coal	49,078,181	104,006,201	107,127,282
Metals, glass, and alum	51,070,469	121,207,878	129,699,113
Marbles, stones, and slates	(?)	15,070,444	17,393,574
Total	108,226,942	254,346,260	267,796,171
Total in £ sterling	4,329,076	10,173,848	10,711,844

The above records of mineral produce only include the four southern provinces, in which alone there exist any mines properly so called. The "free iron mines" of the five northern provinces produce a large quantity of alluvial iron ore, but are not the subject of any statistical record. In addition to this unknown quantity, the amounts of hardware, arms, and machinery, fabricated principally from the metallic products of the country, would, if known, form a vast accession to the above totals. On the other hand, it is to be observed that these totals include the same materials twice over, viz., as ores and as metals; and, therefore, that, in order to elicit the net aggregate creation of value, the price of the former raw material employed in the manufacture of metals should be deducted from the gross aggregate. Some of the metallic produce, moreover, such as the steel and copper, are produced from foreign ores, or metals in a crude state, the price of which would have to be eliminated in order to form an accurate estimate of the value actually created in this country.

The aggregate value of all the mining and metallurgical industries recorded for 1860 attained the astounding figure of £10,750,000 sterling, the largest amount ever realised in one year. This shows a considerable advance on the preceding year, notwithstanding the depression of many of these branches of trade, and is really much more than double the amount of 1851, viz., £4,333,000. The mineral produce alone has during the same period risen from 57,000,000 to 120,000,000 francs, showing the great opulence of the country in raw materials as well as in manufactures. Specimens of all these mineral products, including slates, stones, marbles, ores, coal, marl, clays, &c., were sent to the London Exhibition.

The increased export of the principal minerals, metals, and metallic manufactures from Belgium, has been nearly as striking as their increased produce, the amount of value having doubled since 1851. The increase in the quantities of the several articles exported will be found to have been still more remarkable than the increase of values, for most of these goods have declined in the market during the last ten years. The year 1861 has been one of great depression. Some of the principal staples have been less exported, such as coal, nails, rails, hardware, glass, and zinc; while other exports, viz., iron ore, pig iron, wrought iron,

castings, machinery, and arms, have increased. The demand for these two latter articles seems to be insatiable.

Another most conspicuous manufacture is that of zinc. The raw material is derived from several mines in the province of Liege, but most of all others from the celebrated mine of La Vieille Montagne, at Moresnet. The concession originally granted in 1806 extends over 8,500 hectares, of which the greater part is in Prussia, 2,875 hectares are in Belgium, and 305 hectares, including the commune of Moresnet, and the great bed of calamine, form a neutral, or rather a joint territory. At the Peace of 1815, both Prussia and the Netherlands struggled to obtain possession of this prize; but as the question was left undefined, both powers agreed to govern it jointly. It is administered by two "Commissionaires," appointed severally by Belgium and Prussia. The conscription is not enforced. The mine tax is paid in equal portions to each.

The powerful Company of "La Vieille Montagne" possesses numerous other concessions of calamine, lead, pyrites, and coal in different parts of Belgium, Prussia, France, and Sweden. It employed in 1860, 5,627 operatives, representing, with their families, 17,000 individuals, of whom 11,756 live in Belgium or Moresnet. The wages paid by the Society in the same year were 3,638,896 francs. No Company has made greater efforts to ameliorate the moral and material condition of its servants. It has adopted the plan of encouraging their zeal by ensuring to each one, in addition to his fixed wages, an eventual share in the result of his own labour, calculated on the task-work principle, applied either individually, or to the squad of hands attached to each furnace or workshop. It has founded a "caisse de secours," a "caisse de prévoyance," and a savings bank, for the exclusive benefit of its own operatives; built dwelling-houses, churches, schools, butchers' and bakers' shops; organised choral unions, archers' and rifle companies, and an annual festival. Its production of raw zinc amounted in 1860 to the enormous amount of 28,925 tons, principally manufactured at Angleur and Tilff, near Liege. The net profits of the Company, notwithstanding the constant fall in the price of zinc, were in 1860, 3,118,132 francs, allowing a dividend of 25 per cent. on the paid-up capital of 9,000,000 francs, besides liberal allowances to the directors. Their zinc-works at Angleur are the largest factory in the kingdom, and a model of order.

The number of operatives, of all ages and sexes, employed in the mines above and below ground, has increased from 55,861 in 1851, to 89,373 in 1860. The number of accidents has increased in a proportion nearly similar, but has diminished since 1855. The years 1854 and 1855 were marked by a great and sudden expansion of the coal trade, by the employment of many thousand fresh hands, and consequently by a great increase of accidents. As many as 252 were killed in 1855 alone, and only 219 in 1860, though the number of operatives had risen to 89,373.

Most of the accidents are found to occur from falls of the roof, stones, or coal in mines. The next most dangerous enemy of the miner is carburetted hydrogen gas (fire-damp); the number of casualties from this cause alone was 74 in 1855, and 47 in 1860, nearly all fatal. A Belgian engineer, Mr. Mueseler, has invented an improved safety lamp, which is highly praised as having stood the test of many years' experience. Another, Mr. Guibal, has exhibited a process patented by him for ventilating mines, which is now in successful operation here. Another fruitful source of accidents is the cages or "cuffats" used for ascending or descending the pits; these are now advantageously replaced in the best managed mines by the apparatus called in Belgium "waroquère," similar to our "man-engine," and to the German "fahr-kunst." Irrespectively of all these dangers, the life of a collier here is generally short, being often abridged in middle life by a species of phthisis, called in popular language "le charbon sur la poitrine."

Crime is unfortunately very prevalent in the great mining district called the "Entre Sambre et Meuse;" less so in the Mons coal district called the Borinage. It is the natural consequence of a dense and uncivilised population; the high wages of labour attract the women and children to the pits, causing their homes and schools to be neglected. This must lead to demoralisation, ignorance, and crime. The exploits of the "Bande Noire," a numerous association of house-breakers lately brought to justice, disclose a state of great depravation. Some legislative measures are called for to check the employment of women and children in the pits, and to promote the moral welfare of the miner.

Ample provision seems to be made for his material welfare. Of all the 89,373 operatives engaged in this industry, 80,783, or nine-tenths, are affiliated to the "caisses de secours," and to the "caisses de prévoyance." The former are funds established at every mine for the temporary relief of wounded and sick miners; the latter are funds created by the association of all or most of the mines belonging to each of the six groups, for the purpose of giving permanent relief to disabled miners, or to the widows of those killed by accidents, and temporary relief to their children. Affiliation to these latter "caisses" is made a condition of all concessions granted since 1840.

In 1860 there were 325 mines, and 80,783 men affiliated to the "caisses de prévoyance." In these mines the stoppages from the miner's wages are divided into two parts; the first and principal part is paid into the "caisses de secours;" the other part, which varies from ½ to 1 per cent. of the year's wages, is paid into the "caisses de prévoyance." The master contributes to this latter fund an equal sum, in compliance with the statutes of the association; these statutes are sanctioned in every instance by Royal Arrêté. The "caisses de secours" are nominally supported by the workmen alone, but in most of them the masters fill up any deficiency which may be found to exist at the end of the year.

In 1860, the six "caisses de prévoyance" raised a gross revenue of 1,002,067 francs, and expended 751,742 francs; the "caisses de secours" raised 1,011,646 francs, and expended 885,975 francs. The aggregate receipts of the two classes of "caisses" during the same year amounted to 2,013,713 francs, of which 1,330,712 francs proceeded from the contributions of the operatives, 488,397 francs from the masters, 151,580 francs from miscellaneous sources, mostly the interest of money in the funds, and 42,824 francs from state subventions. The aggregate expenditure of both classes amounted, in 1860, to 1,697,718 francs, principally in the shape of pensions, relief to wounded, sick, and infirm workmen, medical fees, medicines, dressings for wounds, and school fees for children. The Mons "caisses de prévoyance" alone distributed, in 1860, 264,475 francs to 1,814 recipients; one half of this sum was given as an "extraordinary relief" to 606 miners severely wounded, a class not legitimate claimants on this fund, the local "caisse de secours" attached to each mine being the proper vehicle of temporary relief.

The wages of pitmen in Belgium average 912 francs per annum, or 3 francs 4 centimes per day, reckoning 300 working days in the year. In Hainaut, a collier earns an average of 969 francs per annum, or 3 francs 23 centimes per day. The average earnings of all ages and sexes employed in and about the mines amounted, in 1860, to 708½ francs, or 2⅓ francs per working day. During the same year the operatives paid on an average 5 francs per head to the "caisses de prévoyance," and 11 francs 48 centimes to the "caisses de secours;" total, 16 francs 48 centimes, or 2½ per cent. of their earnings.

Immense sevices have been rendered by these institutions during the twenty years of their existence. Neither England nor France can show any similar collective associations, extending each over a large group of mines, and calculated to provide for the victims of the most extensive disaster; they have been the fruit of voluntary combinations of the masters, and though sanctioned by decree, have not yet been chartered by legislative Act.

Two other cognate institutions, eminently useful to the labouring classes, viz., the "Caisse Générale de Retraite," and the "Sociétés de Secours Mutuels," have been chartered by laws declaring them "institutions of public utility." The Council of Mines, and all the Boards of the "caisses de prévoyance" have long sought in vain to obtain a similar recognition for the latter, in order to enable them to hold property, sue for debts, receive donations and bequests, and obtain exemption from stamp and registration duties. A Bill was introduced in 1854 on this subject, but was lost in the political crisis of 1857, partly owing to the prejudices excited against the creation of so-called "personnes civiles."

In 1850, the number of coal mines conceded was 254, comprising an extent of 103,966 hectares, and that of the mines temporarily tolerated was 56, covering 26,603 hectares. In 1860, the numbers of the same were respectively 264 conceded mines, covering 114,655 hectares, and 26 tolerated mines, covering 13,372 hectares. Of these 290 mines, only 192 are now worked, showing a considerable reduction on the figures of 1850, and especially on those of 1855. These 192 mines were worked by means of 355 pits, by 955 steam-engines of 47,255 horse-power, and by 78,232 operatives, including 54,700 men, 7,752 women, and 15,780 children.

The production of coal has increased in ten years by 50 per cent, in quantity, and has more than doubled in value, so that in 1860 it attained the amount of 9,610,895 tons, valued at 107,127,282 francs, being an average of 11 francs 14 centimes per ton, about double the price of English coal. There are few tracts in the world so rich in coal as Hainaut. This province possesses every variety, from anthracite, burning without any flame, to the bituminous description called "charbon gras," extremely suitable for making coke, and to the flaming variety termed "fléau," similar to our cannel coal, and much in request for glass furnaces and steam-boilers. The following table will exhibit the names, quantities, and prices of the five different

Statement of the Quantities, Qualities, and Prices of the Coal raised in the three Coal Provinces of Belgium in 1860.

Qualities.	Province of						Whole Kingdom.
	Hainaut.		Namur.		Liege.		
	Tons.	Price.	Tons.	Price.	Tons.	Price.	Tons.
1. Thin coal ("Charbon maigre"), burning almost without flame—							
Large	...	...	...	...	2,106	19·70	2,106
Medium ("Menu gailletteux")	...	...	182,864	6·98	453,043	9·43	635,907
Small ("Terre houille")	22,115	9·13	21,664	6·89	917	9·98	44,696
2. Dry coal, with short flame—							
Large	153,689	14·43	...	...	...	...	153,689
Small ("Menu gailletteux")	639,061	6·83	...	...	...	...	639,061
3. Thin coal, with long flame—							
Large ("Gaillettes")	201,200	23·78	...	...	...	...	201,200
Medium ("Gailletteries")	340,900	22·18	...	...	...	...	340,900
Small ("Menu gailletteux")	1,262,700	9·86	...	...	...	...	1,262,700
4. Bituminous coal ("Charbon gras"), burning with long flame—							
Large	326,310	20·68	...	...	13,862	19·37	340,172
Small	3,427,225	10·45	...	...	499,389	9·13	3,926,614
5. Bituminous coal, termed "Maréchale"—							
Large	16,940	21·38	...	...	32,780	18·87	49,720
Small	1,117,510	11·13	...	...	896,550	10·01	2,014,060
Total, tons	7,507,720	...	204,528	...	1,898,647	...	9,610,895
Total value in francs	86,799,913	...	1,427,536	...	18,906,833	...	107,127,282
Average value per ton	...	11·53	...	6·08	...	9·94	11·14

qualities raised in the kingdom, according to the official classification. The most valuable is the "charbon maigre à longue flamme," found only in Hainaut, and sold at 23 francs 78 centimes per ton (for large coal). All the Namur coal is an inferior "charbon maigre," worth, in 1860, from 6 to 7 francs per ton. The Liege coal is good, but too small. It crops up close to the surface, and is said to have been the first of any in Europe used for fuel.

The three principal coal-fields of Belgium, viz., those of the Couchant de Mons, of the Centre, and of Charleroy, are all situated in Hainaut. The first steam-engine for raising coal in Belgium was established here in 1807 at the colliery of Bois du Luc. Steam-pumps had already been used since 1774. The number of pits was diminished, but the gross produce has steadily increased in this province since 1856. The average price has fallen from 13 francs 46 centimes, to 11 francs 56 centimes per ton. The Charleroy basin is that which now produces the largest quantity of coal. The Mons and some of the Centre coals are, however, much superior in quality, the former for furnaces, the latter for domestic use. The Centre is the most fortunate district of all in possessing pits not subject to fire-damp or water, and a few seams of the greatest regularity, and of the best quality, called "demi-gras." Here are situated the great collieries of Mariemont, Bascoup, and Olive, belonging to one firm, and supplying the capital with the best coal for domestic purposes. The present wholesale price of the best large coal at Mariemont is 24 francs 50 centimes; and that of the mixed coal, called "tout venant," is 14 francs 75 centimes. The three other coal-fields are those of Namur, Huy, and Liege.

One peculiarity of the Hainaut mines is that in certain localities, especially at Fléau, there exist two and sometimes three different concessions in different seams of coal, lying one below the other within the same vertical limits. This accumulation of narrow concessions, some horizontal, others vertical, most of them dovetailed into each other, all of them cramped or crowded together, is a serious obstacle to economical working. In comparing together the profits realised by the three great coal basins of Hainaut the Centre leaves the other two far behind it, as the offi-

cial returns would give it a clear profit of 2 francs 50 centimes per ton of coal raised against 1 franc 48 centimes, and 79 centimes realised respectively by the other two basins of Mons and Charleroy.

The first companies for working collieries in Belgium were formed by the miners themselves. In some mines there are still a few shareholders of this class, but they have generally made way for joint stock companies. The original "Sociétés Civiles" and "Sociétés en Commandite" have again made way themselves for the modern "Sociétés Anonymes," on the principle of limited liability. Many of these were rashly formed in the years 1834, 1835, and 1836, for the purpose of working collieries and iron factories, &c. A short period of artificial prosperity was followed by a long one of real depression. Industry did not recover till 1843, but was again prostrated by the events of 1848. However, a new tide of prosperity set in after 1850, which lasted till the war of 1859. New pits were sunk, thousands of new hands were engaged, large fortunes were realised in a few years. One share in a certain colliery, which, in 1830, used to return 2,500 francs per annum, now brings in 45,000 francs. Some shares, such as the "Produits au Fléau," have paid 30 per cent. dividend, and have sold for four times their original value. Many working men have risen to wealth. One of the most opulent individuals in Belgium, now Bourgmestre and representative of his native town, owes his fortune to successful speculations in these mines.

The exports of coal, which were 1,600,000 tons in 1849, have since then more than doubled, being set down at 3,450,000 tons in 1860. France, of course, took the great bulk of these exports, viz., 1,453,000 tons in 1850, 3,298,000 in 1860, and 3,217,000 in 1861. The French imports from Belgium were three times greater in 1860 than those from England, a fact which, in the face of the undoubted superiority of British coal, can only be accounted for by the differential duties then and still existing in France in favour of Belgian coal. About two-thirds of the Belgian exports to France pass through the two bureaux of Condé and Jenneant, *i.e.*, by the Mons and Condé canal, and by the River Sambre; 630,000 tons more are sent by railway from Mons towards Maubenge. All the above imports paid the entrance duty of 1 franc 80 centimes per ton: some imported by the River Meuse paid the reduced rate of 1 franc per ton, while English coal during the first half of 1860 paid the duty of 3 francs 60 centimes when imported into France by any port north of the "Sables l'Olonne."

The duties now levied in France are 15 centimes per 100 kilogrammes, plus the 2 décimes, making in all 1 fr. 80 centimes per ton on all imports of coal and coke by sea (in French or assimilated vessels) and by land, with the single exception of the zone formed by the departments of the Moselle and Ardennes, in which the duty is only 1 franc 20 centimes per ton. Hitherto but a small part of Belgian exports (139,718 tons in 1860) have found their way over this frontier, but the opening of four new railways connecting Belgium with the above two departments will now admit of a large trade. This preferential zone is probably only intended to last till 1864, but even so it appears hardly compatible with the 19th Article of the Anglo-French Treaty of 1860.

Belgian is now being rapidly supplanted by English coal in the coast towns of France, and by French coal in the departments of the Nord and the Pas de Calais. In the former department, the Anzin coal basin vies with any in Belgium; in the latter, new and productive mines are being worked with great success, and, being connected by rail and canal with Paris, are bringing a new element of competition to this great market, where Belgian coal has hitherto predominated. The department of the Seine alone consumes 1,250,000 tons, of which 1,000,000 is Belgian. Rouen itself, another great manufacturing centre, has been in 1860 about equally supplied by England and Belgium.

Belgian coal being gradually repelled from Paris and the coast, must seek for a compensation in the Eastern and Central Departments of France, especially in the iron district of the Haute Marne, which already consumes large quantities of Mons furnace coal; but the cost of conveyance is still too high. It is true that coal can now be shipped from Mons to Strasburg without breaking bulk, and without paying more than 1 franc per ton in tolls. This canal, however, requires constant repairs, and is too narrow for the usual Belgian boats. On the other hand, the railway is too dear, its charges from Mons to Sermaize being 13 francs 40 centimes per ton, those of the canal boats being 7 francs. Freights from Mons to Paris, in 1860, ranged from 8 to 9 francs per ton; those from Mons to Brussels, from 4 francs to 5 francs 75 centimes. They have since risen. From Mariemont to Brussels, the average freight is 3 francs, but it has now fallen as low as 2¼ francs.

The French Government has done much to encourage the Belgian coal trade by reductions of tolls on canals and railways, by the equalisation of duties on coal and coke, and by the inclusion of the whole department of the Ardennes in the privileged zone paying only 1 franc duty, which zone previously comprised only the department of the Moselle and the River Meuse. It has likewise ordered the purchase by the State, and the opening at mere nominal tolls, of the principal canals of the north of France. Even on these unequal terms the railways can afford to compete with them, and this shows that the canals are now become mere superfluities, which would not pay unless, more or less, provided at the public expense. The Nord Railway now carries coal from Mons to Paris, if sent in a quantity sufficient to fill a train, at 3½ centimes per ton and kilomètre, or at 9 francs per ton for the whole distance (25·8 kilomètres). The reduction of railway freights in France and Belgium is still a great desideratum. I am informed that for very considerable distances the English Companies will transport coal at rates equal to 2½ centimes per kilomètre in summer, and at 3½ centimes in winter. The railway goods tariff in Belgium is still much complained of. It is based on the charges of 5, 4, and 3 centimes per 100 kilogrammes per league on the three different classes of merchandise. Coal, coming under the last class, would pay 7½ centimes per ton and kilomètre. The railway charges from the mines to Antwerp come to from 5 francs 70 centimes to 6 francs 65 centimes per ton, and prevent all attempt to export coal by sea. The railway charge from Mons to Brussels is now 5 francs per ton; less, therefore, than the canal charges. Still the latter conveyance is preferred on account of its being less injurious to the coal.

The imports of coal into Belgium during recent years may be seen in the following short statement:—

Imports from	1851.	1857.	1859.	1860.	1861.
	Tons.	Tons.	Tons.	Tons.	Tons.
England	3	74,686	53,896	42,988	38,704
France	9,038	64,863	54,902	52,865	51,429
Prussia, &c..............	957	6,520	1,271	1,151	2,638
Totals	9,998	146,069	110,069	97,009	92,771

The imports of English coal are yearly falling off, so that they are now less than those from France by 13,000 tons. These latter are principally confined to some localities in West Flanders, which are situated nearer to the French mines than to those of Mons. French coal pays a duty of 1 franc per ton. English coal pays 1 franc 70 centimes, but still finds a market at Bruges, Antwerp, and even at Ghent when freights are low, but not so far as Brussels.

During the past year the stagnation of the iron and other trades has had a depressing effect on that of coal. The mildness of the late winter has again weakened the demand, so that the stock at Mons alone had risen in February to 2,250,000 hectolitres in wharf, without counting that lying at the pit mouths. The reports from Charleroy and Liege are similar. Still it does not appear that the men have been thrown out of employment.

ELECTRO-MAGNETIC PHONOGRAPH.

This machine is capable of being attached to pianofortes, organs, and other keyed musical instruments, by means of which they are rendered melographic, that is, capable of writing down any music that is played upon them.

So keenly have musicians at all times felt the extreme tediousness of writing music by hand, and the impossibitity of preserving the most valuable impromptu pieces in their full and flowing beauty, that immediately on the introduction of the pianoforte into England strenuous efforts were made by men of inventive skill to supply the instrument with the means of registering the music performed upon it. "The first pianoforte seen in England was made by one Father Wood, an English monk at Rome, and by him sold to Samuel Crisp, Esq., who sold it again to Fulke Greville, Esq., for one hundred guineas."* This was about 1757.

The Rev. — Creed would appear to have been one of the first, if not the first, to think of constructing a melographic instrument, and in the year 1747 he sent to the Royal Society a paper, entitled "A demonstration of the possibility of making a machine that will write extempore voluntaries, or other pieces of music, &c."†

There are also obscure accounts of a machine made in 1770, by a monk named Engramelle.

In a German work of 1774, John Frederick Unger, a counsellor of justice at Berlin, claims priority of invention against Mr. Creed, though it seems most probable that each made a similar invention unknown to the other.

There is no doubt whatever that the Académie of Berlin was presented by Hohlfield—an ingenious mechanic who received some suggestions from Euler—with a machine which, to a limited extent, answered its purpose. It consisted of two cylinders moving paper between them, on which, by means of a crayon, each key made a mark when pressed down in the act of playing. But not only was the action of playing very fatiguing, but the music must have been of a most inconvenient width—that of the key-board—and without any stave, accidentals, &c.; it fact, a mere series of dots showing such and such keys were pressed down in the course of the performance, but utterly failing to mark the time, key, or accidentals. The Académie, however, in consideration of the great ingenuity of the contrivance, rewarded the inventor with a handsome gratuity.

In 1827, M. Carreyre made trial, before the Committee of the Fine Arts of the Institute of France, of a melographic piano, which consisted of a clockwork movement, which unwound from one cylinder to another a thin plate of lead, on which were impressed, by the action of the keys of the instrument, certain peculiar signs, which might be translated into the ordinary notation by means of an explanatory table.

"After the experiment, the plate of lead was removed, to make the translation, and a commission was appointed to report; but as no report was ever made, it is probable that the translation was not found to be exact. At the same time M. Baudouin read before the Institute a paper, accompanying it with drawings, concerning another melographic piano; upon the merit of which we do not find that the Institute pronounced."‡

These accounts prove two important facts; the great efforts made and the small success achieved—this want of success proceeded from the lack of a proper motive power, none having used electro-magnetism—for it must be evident to all acquainted with music that these were as yet nothing more than partially successful experiments, and produced no further results than stimulating inventors to continued exertions.

The causes of failure were many, the most serious being the oversight of endeavouring to derive the mechanical power from the keys of the piano, whereas some power, which, while depending upon the action of the key for its liberation and manifestation, should at the same time exert its force without strain upon the key, still remained a desideratum. Such a power is electro-magnetism, as the mere motion of a piano key, without any alteration in the touch required—may be made to call forth a force of any magnitude required. Now, in Unger's machine the power was derived from the keys alone, and by direct action, thus rendering the touch of the piano so heavy that no one could perform properly upon it. For this reason it is unnecessary to consider further its defects. M. Carreyre's, besides being equally objectionable on the score of its unavoidably heavy touch, and arbitrary and unmeaning signs, produced at the best but an indented sheet of lead, a medium for writing music on most inconvenient and unmanageable.

A machine which should register in plain black and white on common paper the music performed, giving the score on the ordinary stave, using the flat, sharp, and natural signs, as in all modern music, accurately registering time, bars, legato and staccato, 8va, alto, and basso passages, and adapted to all keys, still remained a desideratum, for from 1827 to 1863 no further progress was made, though many continued to give their attention to the subject.

But in 1863 Mr. Fenby applied electro-magnetism, and a machine was patented by him, January 13th, in that year, which, without altering the touch or appearance of an ordinary piano, is stated to be capable of registering the most complicated music.

Before giving any detailed description of the construction and capabilities of the phonograph, it may be well to point out the obstacles to be overcome in the notation, and thus to separate the possible from the impossible.

The most obvious difficulty—and one which if not overcome would render all other excellencies nearly, if not quite, futile—is the means of marking the various durations of the notes from the breve to the demisemiquaver, &c. This was a difficulty, inasmuch as the ordinary open, closed, and tailed notes cannot possibly be rendered available in an instrument registering that which is performed upon it.

The following considerations will render this apparent. The longest note is practically but the fusion of a number of shorter notes, from which it follows that on any particular key being depressed, as in playing, its first touch would be the shortest note of the notation, and the machine would immediately print such shortest note, and could not afterwards alter it; for to suppose a piece of machinery to render shorter or longer notes by arbitrary signs, having but a fictitious relation to their duration, is to suppose its possession of a reasoning power, the absurdity of which needs no comment. From these considerations, and others which will readily occur to the mind of the reader, it is manifest that some system is required in which the duration of sound and the performance of the printing may be co-existent, and thus produce a complete reciprocity of action between the two. In other words, a short note must be capable of becoming a long one in the printing as in the playing.

Bearing these facts in mind will lead to a complete comprehension and appreciation of the system. Each note shows the portion of time occupied in playing it by the length it occupies in the bar, and consists of a horizontal black line proportionate in length to the duration of the note, while the rest of the notation needs no comment, it being in all respects identical with that at present in use.

Having considered the notation, the next thing to which our attention will naturally turn is the mechanical appliances employed to produce this notation. First, then, as to the touch of the piano: this remains, to all intents and purposes, the same as if without the phonograph attached, as the mechanical power is not derived

* Rimbault's History of the "Pianoforte."

† Phil. Trans. vol. xliv., p. 445.

‡ Rimbault.

from the motion of the keys, but from a voltaic battery; the only part performed by the key being to bring a small brass stud, on its under side, in contact with a slender spring; this causes an electro-magnet to bring a tracer against the paper which is continually moving at a fixed rate and thus marks the note. When the key is no longer depressed, the tracing ceases, and the rod slides back; this mechanism being capable of registering the slowest or most rapid playing. The accidentals are printed by revolving type, acted on by the same sliding-rod and magnet. The accidentals are adapted for all keys, so that any number of flats or sharps may be correctly registered; the machine being capable of distinguishing accidentals, flats, sharps, and naturals from those which are proper to the key in which the music may be pitched. That is to say, if the key of A natural be used, F, C, and G, when played sharp, will have no sharp sign in the body of the music, whereas if the naturals of these notes be struck, or the sharps of any others, suitable accidentals will be printed.

Having now reviewed the notes and signs proper to them, the bars will be considered. The barring ot the music is performed in a simple manner, precluding the possibility of derangement, and is yet so accurate in adjustment that it correctly follows the accentuation of the most complicated piece of music. When a rallantando movement occurs, the bar or bars through which it runs will be actually lengthened in such a proportion as will accurately denote the character and expression of that part of the music. The same manifest advantages occur in the matter of legato and staccato movements.

The machine requires only blank paper, as it rules the stave and prints the score simultaneously. The inventor furnishes a small battery of convenient and simple form. The charge consists of sulphate of copper and water: one charge lasting for some months. The whole is in a neat drawer at the bottom of the machine, and offers nothing of difficulty or unpleasantness in its management, and requiring to be touched only to supply water to it.

BRITISH ASSOCIATION, NEWCASTLE-UPON-TYNE, 1863.

Remarks on Armour Plating for Ships. By Captain Douglas Galton, F.R.S.

The earlier experiments made on iron plates showed that 4½-inch plates at least were necessary to resist shot. This thickness of iron still leaves the plate liable to be bent or fractured, and knocked off even when not directly penetrated, and the extent to which it would thus suffer will to some extent be regulated by the character of the backing.

The plan adopted in the Warrior target is simply that suggested by the idea of bolting a plate of iron to the side of a wooden ship. The iron skin of the Warrior is covered with two layers of teak planking, each 9 inches in thickness, the one horizontal, the other vertical, and outside of these is the armour plate, 4½ inches thick, secured by bolts screwed up with nuts inside of the ship. The armour in this case is generally considered to consist of two distinct parts—the plate and the backing—but practically there is only the plate. The backing prevents the injuries sustained by the plate from being communicated immediately to the ship, but it affords no effectual support to the plate itself; for, supposing each square inch of timber surface to be capable of sustaining a pressure of one ton, the area of a 68-pounder shot would give a support of about 50 tons to the armour plate, but the work in this projectile at 200 yards range, with the regular service charge of 16lbs., is 2,565,000 foot pounds, or about 1,150 tons, so that at best the timber is only capable of sustaining 5 per cent. of the blow, leaving 95 per cent. to fall to the share of the armour plate, hence the plate at the point of impact is driven into the yielding backing, and the distant parts or edges of the plate are bent outwards, wrenching it away from its fastenings. The fastenings torn asunder are destroyed, and those under, or in the immediate vicinity of the blow are, if not broken, rendered comparatively useless, because the crushing of the backing reduces the space between the plate and the ship's side. But the most severe test to which any target has been subjected at Shoeburyness is far less severe than the ordeal ships would have to withstand in defending the entrance of, or in forcing a passage into, a harbour. At the trial of the Warrior target already referred to, the nature and extent of the test to which it was subjected was as follows:—29 rounds in all struck the target, embracing a total weight of 3,336 lbs. of metal, propelled by 400 lbs. of powder, and representing an amount of work done in foot pounds of 62,570,000. Of this total, however, 32,392,000 goes to the credit of shell and solid shot at low velocities, which are held to be almost innocuous against such targets as the Warrior. Of the thirteen rounds of solid shot at high velocities four only were 68-pounders (and one of these is said to have missed the target), representing work done to the extent of 10,260,000 foot pounds, about one-sixth of the total work, and if one round missed, as alleged, one-eighth; thus, three out of the 29 rounds go to the credit of the old 68-pounder, which is said to be the most effective gun in the service against iron plates. Of the 29 rounds not more than five or six were fired in salvo, and yet the plates were deeply indented, buckled, and badly fractured, and many of the fastening bolts were broken, so that, had the target been part of the side of a ship rolling on the sea, the plates would probably have fallen off in consequence of the destruction of the fastenings. But the strain in such a test as this is far less than that from a well concentrated broadside such as the crew of every French ship is regularly exercised to give.

The next class of targets to which I shall refer had a rigid backing. These targets were composed wholly of iron.

Mr. Hawkshaw proposed one consisting of a thick front plate backed by a series of thin plates secured by rivets. Mr. Scott Russell proposed a most ingenious arrangement, by which the strong front plates were kept in position without any rivets or bolt heads being exposed; others were also tried.

The trials of these targets have tended to demonstrate that a perfectly rigid backing is not desirable; indeed, if we argue from analogy, such a result would have been seen from the first. The permanent way of a railroad is subject to blows from heavy weights moving at high velocities. In the infancy of railways the rails were laid on large stone blocks, and even on solid walls of masonry, but it was soon found that on these rigid roads the rails and carriages suffered far more severely than where an elastic road of sleepers on ballast was used, and the rigid road has long since been abandoned.

The arrangement required for the armour-plating of a ship is a strong front plate, in which deflection under blows shall be prevented, but which shall have some cushion behind to prevent the full concussion of the blow being communicated to the side of the ship.

The best form in which to distribute material in a beam so as to prevent deflection, is to obtain depth; hence, in tubular girders, the top and bottom flanges are separated by a comparatively light web.

Without exactly comparing the effects of the blow of a shot to the weight on a beam, it is apparent that as the best form in which to place the material to resist shot is that which will allow of the smallest yielding at the point of impact, it follows that after reserving a sufficient force of metal for the front plate, the remainder should be placed in that shape which is resorted to for obtaining stiffness in beams.

The target to which I wish to draw attention is constructed on these principles. It has the metal placed in a form suited for resistance, and it has a cushion of wood interposed between the target and the ship. This

target was invented by Mr. Chalmers. When submitted to the Admiralty it was refused to be allowed to be made at the government expense, but Sir Morton Peto was so satisfied with the principles upon which the target was proposed to be made, that he assisted Mr. Chalmers in bringing it to trial by constructing it entirely at his own expense.

It will be seen that this target consists of—1st, a thick front plate as the top flange of a beam; 2nd, of ribs to support it as the web of a beam; 3rd, of a plate of iron to hold up the ribs as the bottom flange of a beam, and that the ribs are themselves supported laterally by timber to prevent their lateral deflection. Between this and the side of the ship a cushion of timber is interposed.

This target underwent a similar trial to the Warrior target, and the result partly confirmed the anticipations formed. The bolts and plates were not fractured, and the ribs were found to have supported the plate so satisfactorily as actually to have been driven a quarter of an inch into it at the parts where indentations on the front took place. It is in fact the best target which has been tried.

The Warrior target has 18 inches of timber and $4\frac{1}{2}$ inches of iron outside the skin of the ship, or 360 lbs. to a square foot.

On Mr. Chalmers' principle this weight allows of $3\frac{3}{4}$ in. armour plate, half inch for each rib, one inch for the back plate, and $1\frac{1}{4}$ inch for the timber cushion.

As regards cost, Mr. Chalmers' plan would have enabled 200 tons of the front plate coating, from £40 to £50 a ton, to be replaced by iron of from £15 to £20 a ton for the ribs and back plate.

It is not intended to be suggested that this form of target is perfect, but that it is in this direction that experiments for devising the best form of armour plating should be made.

PROGRESS OF AMERICAN MANUFACTURES.

The Superintendent of the United States Census, in his preliminary report, states that the increase of printing presses in the book and newspaper manufacture has been great beyond all precedent, and has exerted the most beneficent influence by cheapening and multiplying the vehicles of instruction. Its effects are everywhere apparent. Never did an army before possess so much of cultivated intellect, or demand such contributions for its mental food as that now marshalled in its country's defence. Many of these reading soldiers ripened their intellectual tastes during the last ten years. In fact, many divisions of our army carry the printing press and type, and the soldiers issue publications and print the forms for official papers. The press is, indeed, the great prompter of enterprise. It constantly travels with the emigrant to diffuse light and intelligence from our remotest frontiers, where it speedily calls into existence the paper-mill and all the accessories which it supports in older communities.

In New England, the Middle and Western States, the value of book, job, and newspaper printing is returned as 39,428,043 dollars, of which eleven millions' worth consisted of books, the value of the latter being nearly equal to the whole product of the same branch in 1850, which was returned at 11,586,549 dollars. The manufacture of paper, especially of printing paper, has increased in an equal ratio, the State of Massachusetts alone producing paper of the value of 5,968,469 dollars, being over 58 per cent. of the produce of the Union in 1850. New York returned paper of the value of 3,516,276 dollars; Connecticut, 2,528,758 dollars; and Pennsylvania, 1,785,900 dollars.

The sewing-machine has also been improved and introduced, in the last ten years, to an extent which has made it altogether a revolutionary instrument. It has opened avenues to profitable and healthful industry for thousands of industrious females to whom the labours of the needle had become wholly unremunerative and injurious in their effects. Like all automatic powers, it has enhanced the comforts of every class by cheapening the process of manufacture of numerous articles of prime necessity, without permanently subtracting from the average means of support of any portion of the community. It has added a positive increment to the permanent wealth of the country by creating larger and more varied applications of capital and skill in the several branches to which it is auxiliary. The manufacture of the machines has itself become one of considerable magnitude, and has received a remarkable impulse since 1850. The returns show an aggregate of 116,330 machines made in nine States in 1860, the value of which was 5,605,345 dollars. A single establishment in Connecticut manufactured machines to the value of over 2,700,000 dollars, or nearly one-half of the whole production in that year. During the year 1861 sewing-machines to the value of over 61,000 dollars were exported to foreign countries. It is already employed in a great variety of operations and upon different materials, and is rapidly becoming an indispensable and general appendage to the household.

Among the branches of industry which have been signally promoted by the introduction of the sewing-machine is the manufacture of men's and women's clothing for sale, which has heretofore ranked with the cotton manufactures in the number of hands—two-thirds of them females—and the cost of labour employed. The increase of this manufacture has been general throughout the Union, and in the four cities of New York, Philadelphia, Cincinnati, and Boston, amounted in value to nearly forty and one-quarter millions of dollars, or over 83 per cent. of the product of the whole Union in 1850. The manufacture of shirts and collars, of ladies' cloaks and mantillas—a new branch which has received its principal impulse within the last ten years—and of ladies' and gentlemen's furnishing goods generally, form very large items in the general aggregate of this branch. They severally employ extensive and numerous establishments, many of them in our large cities with heavy capital. In Troy, New York, the value of shirt collars alone annually manufactured is nearly 800,000 dollars, approximating in value to the product of the numerous and extensive iron founderies which have been a source of wealth to that city.

The influence of improved machinery is also conspicuously exhibited in the manufacture of sawed and planed lumber, in which the United States stands altogether unrivalled, as well for the extent and perfection of the mechanism employed as the amount of the product. This reached, in 1850, the value of 58,521,976 dollars, and, in 1860, 95,912,286 dollars, an increase of 64 per cent. in the last decade. The western States alone, in the latter year, produced lumber to the value of 33,274,793 dollars, an increase of 18,697,543 dollars, or 128 per cent., over their manufacture in 1850. The Pacific states and territories produced to the value of 6,171,431 dollars, and the southern 17,941,162 dollars, a respective increase of 3,841,826 dollars and 9,094,686 dollars in those sections, being a ratio of 162·7 and 102·3 per centum.

OSTREOCULTURE AND PISCICULTURE IN FRANCE.

Among the different parts of the French littoral which have more particularly attracted the notice of the government, the "Bassin d'Areachon," situated on the Bay of Biscay, and in this department, may be cited as particularly favourable to the production of oysters.

This bay, which receives the waters of the Atlantic, has been, from time immemorial, celebrated for its oysters, known by the name of *gravettes*. The nature of the ground, composed of sand and mud, extending over a surface of about 100,081 acres, but of which 2,965 acres only are available, is well adapted to the breeding and to the development of this shell-fish. But owing to the latitude allowed to the fishermen, and the supineness of the maritime authorities, the bay had become almost entirely de-

populated. This state of things at length awakened the attention of the Government, and in 1854, oyster-fishing in the Bay of Areachon was forbidden, and the interdiction remained in vigour till the close of 1859. The result was excellent, for where, in former years, barely the sum of 1,000 francs had been produced, the result of the first year's fishing, after its re-opening, produced to the fishermen upwards of 230,000 francs independently of the private concessions.

The ground being the property of the state, the Minister of Marine determined to make experiments on a portion of it, and in 1854 two beds, of the extent of 53 acres, were prepared and gradually stocked. Concessions of ground were also granted to private industry for the same purpose, when in 1859, M. Coste, who had previously acquired some celebrity from his theory of pisciculture, visited the bay, and induced the inhabitants to believe that they had an inexhaustible source of wealth within their reach. The maritime authorities, jealous of his interference, and convinced from experience of the exaggeration of his statements, wisely endeavoured to moderate the ardour of speculation, by stringent regulations.

From their researches and experiments they had ascertained that only a portion of the ground was adapted to the breeding of oysters, and this, with few exceptions, they determined should be reserved for the special benefit of the fishermen, upon the principle that the maritime population on whom the service of the state fell so heavily, were alone entitled to derive all possible benefit from the fruits of the sea. A portion of the ground which is unfit for breeding, is well adapted to the development and to the fattening of the oyster, and these are the grounds upon which concessions are granted.

Up to the end of 1862, 110 concessions, averaging each about ten acres, had been made, subject to certain conditions, of which the following are the most important:—

The concession to be unlimited, but revokable at any time, and subject to an annual payment of 80 francs to the institution of the "Société de Secours Mutuels de Notre Dame d'Areachon."

To lay down during the first year, at least 20,000 oysters, in each hectare of ground conceded, and 4,000 during the following five years.

To enter into an engagement to try all the experiments that may be recommended.

The two beds belonging to the state have been in full produce for several years. This is estimated at about 2,000,000 a-year; the greatest portion is disseminated over the least productive part of the breeding ground in the "Bassin," and the rest is sent to different points, according to the instructions of the Minister of Marine, but hitherto those oysters sent to Cette and Toulon have not succeeded.

In addition to the native oyster, others from different points have been introduced, particularly from Noirmoutiers, Britanny, England, and Spain. In 1860, about 500,000 were imported at the suggestion of Monsieur Coste, for account of the state, from Marennes. The expenses of these two beds amount annually to about 100,000 francs, namely, for the cultivation, 20,000; for a guardship, 80,000 francs; but this last item is not exclusively for the benefit of the state, as the crew, 60 in number, are occasionally employed to protect the various fisheries, and to serve as a police.

The cost of a private concession of about 10 acres, was at first estimated at 6,000 francs for the first year, and 2,000 francs for each succeeding year, according to the system of cultivation advocated by M. Coste; but these calculations differ greatly from those of the maritime authorities, who are of opinion, that with an annual outlay of 1,300 francs (not including the first necessary outlay for materials, which may be estimated at 500 to 600 francs independent of the purchase of oysters for stocking the bed), a very fair profit may be obtained from the same ground. But where capital is forthcoming, much greater results may be attained by an intelligent employment of it.

On the concessions which are only adapted to the development and fattening of the oyster, the principal expense consists in the purchase of the small oyster. On the best ground it takes from eight months to a year before these are marketable. On those grounds more particularly fitted for the production, the returns are slower, as it requires from two to three years before the oyster attains a size at which it can be lawfully sold, but then even it is not fit for consumption, and must pass into the fattening beds. But once the first outlay in stocking is made, as the reproduction is very great, the chief expense consists in keeping the beds in proper repair, and in favouring the multiplication by artificial means.

The few concessions which combine the two qualities, naturally give the greatest profits, and can, consequently, afford a greater outlay of capital.

During the oyster season of 1862-63, the number of 15,097,000 oysters, which produced 141,967 francs, were bought of the fishermen to stock the beds. These oysters were taken on the various parts of the bay left open to the fishermen.

During the same period, the quantity of oysters fit for consumption, taken from the whole of the conceded beds, amounted to 16,357,000, producing, at the average price of 24 francs the 1,000, the sum of 392,568 francs. These were sent to different parts of the country.

The local consumption may be estimated at about 1,000,000, of the value of about 23,000 francs, making a total of 17,357,000 sold from the 110 conceded beds.

From the year 1856 up to 1860, about 13,000,000 of foreign oysters, in 41 vessels, were imported into the Bay of Areachon, averaging in the former year 18 to 20 francs the barrel of 5,000; but in the latter, the price had risen to 25 francs in consequence of the great demand.

On the unreserved part of the bay, the results of the oyster fishing for the season of 1862-63, was not as satisfactory as in the two preceding periods, for in 1860-61, 19,900,000 were caught; in 1861-62, 18,105,000; and in 1862-63, only 15,097,000. This falling off may be attributed to unpropitious seasons. But it must be remembered that, from 1854 to 1859, scarcely any oysters had been taken from the bay; that their multiplication had made great progress during that interval, consequently it is not surprising that the take should have been greater the first year after the re-opening than in subsequent years. It is, however, expected that when once all the conceded beds are in full bearing, and the open breeding places well stocked and protected by wise and well-enforced regulations, the Bay of Areachon will yield annually a much larger supply.

On the other hand, as regards the conceded beds, the returns show, that a great improvement took place in 1862-63, as compared with 1861-62, the number being 17,357,000 as against 7,500,000.

The increase of the latter period is explained in the following manner:—In 1861-62, only 20 private beds, which composed the original concessions, took part in the sale; the remaining 90, which were granted in 1860, took little or no part. These latter, however, had absorbed the greatest portion of the 53 millions of oysters caught in the bay in 1860, 1861, 1862, besides 13 millions from abroad; and as the oyster cannot advantageously be kept beyond a certain time on the beds, it was necessary in the course of 1862-63 to clear off a certain quantity, this, combined with the desire to get back some part of the capital expended, will account for this great increase.

The importation of foreign oysters is not likely to increase much, unless the native should fail, for it has been remarked that the former are inferior in taste and quality to the latter, though it is believed that in the course of time they will become assimilated with the native kind.

The theory of M. Coste, that the propagation of fish by artificial means can be effected, does not appear to

be adopted by the maritime authorities at Bordeaux, for although he proposed to the Government to form reservoirs for the purpose in the Bassin d'Areachon, no steps have as yet been taken to carry out his views, nor does there appear to be any disposition to commence such an expensive and problematic undertaking. A few private reservoirs have existed for many years, where two or three of the common kinds of fish are kept, which serve to supply the market when the tempestuous state of the weather will not allow the fishermen to venture out to sea.

The present prosperous condition of the oyster fisheries in the Bay of Areachon seems to be mainly owing to the intelligent solicitude of the maritime authorities, and the intervention of M. Coste seems not to have attained those extraordinary results predicted by him. On the favoured spots, and with a good direction, there is no doubt a great increase may be obtained by the old and long tried mode of cultivation, but on those only, for hitherto the artificial means introduced by M. Coste have failed in rendering productive all others. Practice and experience, in this instance, are evidently superior to theory.

Proceedings of Institutions.

Birmingham and Midland Institute. — The last annual report says that, at the commencement of the year, in consequence of a circular which had been issued by the late President, Mr. Arthur Ryland, there was a considerable accession of members, the number being increased to 710. There are at present 687; and, in addition to this, 42 students qualified to avail themselves of the privileges of the general department, making a total of 729, which is an increase of 26 on the number at the close of last year. During the year twenty-nine lectures have been delivered to the members. The number is rather smaller than usual, the delivery of one or two of the lectures which had been announced having been prevented by unforeseen accidents. Four of them, namely, that by Mr. Wiggin, on "Agricultural Chemistry and its Practical Application;" and three by the Rev. W. Campion, on "Astronomy," were given gratuitously. The number of visitors to the Museum has increased from 2,081, in 1861, to 2,385 in 1862. It is frequently visited by persons simply with a view to assist them in their reading. Probably if the advantages it offers were better known to those who have the care of the young, the museum would be made of much more use than it is at present. The meteorological observations have been continued during the past year, and a complete record of the strength, direction, and velocity of the wind, together with the amount of rain-fall, for each hour of each day, is preserved. A reading of the barometer is also taken at nine a.m., daily. In the last annual report the Council invited additions to the Gallery of Art, and some very valuable ones have been received. Mr. Lines has lately presented his picture of "Llyn Idwal;" a gift of no slight value, not only from its intrinsic merits, but from the universal respect and esteem in which the artist is held in Birmingham. A short time since the Warwickshire Drawings, a series of drawings and sketches of great ability by artists of eminence, illustrating the scenery of this county, were advertised for public sale. It was obviously desirable that the dispersion of this interesting collection should be avoided, and the Council desire to record their obligation to Mr. Jaffray and other gentlemen associated with him, by whose public spirit and generosity the whole series has been secured, and handed over to the Institute. The Council have also the pleasure of recording that an offer has been received from Mr. Roden to paint for the Institute a portrait of Sir Francis Scott. The Specification Library has received numerous additions during the past year. It has been attended by 578 persons in 1862, as against 506 in 1861, showing an increase of 72. The Council have devoted a great deal of attention to the industrial department during the past year, being deeply impressed with the desirability of increasing its efficiency and extending its operations. The commencement of several new classes has been pressed upon them; amongst others, classes for the study of the Latin and Spanish languages. The Council, however, have determined that it is not desirable, at present at all events, to establish classes for instruction in those subjects. They feel that their primary object should be to develop, as far as possible, their system of instruction in the different branches of science, and that the absence of a class for practical or theoretical mechanics was a serious omission which they were bound to supply at the earliest practicable moment. They have now completed arrangements for remedying this defect. They gratefully acknowledge the kindness of the Rev. T. N. Hutchinson, who has complied with their request that he would undertake the conduct of such a class, and has added to the obligation by making his services gratuitous. With a view to meet in some measure the demand for instruction in languages, the Council, at the request of many persons, decided in the spring of the year to establish a class for the study of German, and secured the services of Dr. Dammann as teacher. The experiment has so far proved satisfactory, the attendance having been very good in both the terms during which the class has been in existence. On the whole, the attendance at classes during the year has been fully equal to the average of previous years. With a view of accommodating those of the students who have time to spare in the evenings, the Council have caused one of the rooms to be opened for an hour each evening as a reading-room for members of the classes. In the spring an offer was received from G. Harris, Esq., the Deputy-Judge of the County Court, to deliver a course of penny lectures, on Saturday evenings. A few lectures, of a very interesting kind, were delivered by Mr. Harris, but the attendance was not found to be large enough to justify the continuance of the course. The income and expenditure accounts for the past year show that the expenditure has exceeded the income by the sum of £59 18s. This result has chiefly arisen from the unusually small receipts for admission to lectures, and an exceptional outlay on repairs. The income in the general department amounted to £741 10s. 3d., and the expenditure to £652 15s. 5d. In the industrial department the income amounted to £225 5s. 7d., and the expenditure to £373 18s. 5d.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, October 9th*, 1863.]

Dated 7th August, 1863.

1950. F. G. Mulholland, 36, Essex-street, Strand—Imp. in pipe castings for gas, water, sanitary, and other general purposes, and the introduction of an elastic chemical compound to form expansive joints thereto for prevention of leakage.

Dated 26th August, 1863.

2103. J. Thomas and W. F. Marshall, Shipley, Yorkshire—Imp. in apparatus for spinning.

Dated 31st August, 1863.

2152. A. V. Newton, 66, Chancery-lane—Improved machinery for sawing irregular forms of wood. (A com.)

Dated 17th September, 1863.

2285. J. G. Ulrich, 47, Wellclose-square—Imp. in apparatus applied to railway carriages and trains in order to obtain greater safety to passengers.

Dated 19th September, 1863.

2314. I. de Angelis, 54, Greek-street, Soho—An improved apparatus for obtaining motive power. (A com.)

Dated 21st September, 1863.

2329. C. T. Burgess, 3, Upper Gower street—Imp. in reaping machines.

Dated 22nd September, 1863.

2338. R. A. Brooman, 166, Fleet-street—Certain compositions for preserving cheese. (A com.)

Dated 24th September, 1863.

2350. A. E. Ragon, Caroline-street, Bedford-square—Improved machinery or apparatus for stirring or mixing various ingredients or materials to a pasty consistence, said machinery being especially adapted to the manufacture of bread and other articles of food. (A com.)
2351. W. Woofe, Gloucester—Imp. in implements for tilling the soil, and in means of drawing ploughs and other implements for tilling through the land.
2352. T. Marshall, 12, Gate street, Lincoln's-inn-fields, and W. Marshall, 200, Regent-street—Metallic instruments to be used as substitutes for bristles in sewing, stitching, closing, and otherwise joining boots, shoes, and other leather work.
2353. E. Dronke, Oldhall-street, Liverpool—An improved mode of manufacturing gunpowder suitable for war, mining, and general purposes. (A com.)
2354. W. G. Helsby, Liverpool—Imp. in mounting or setting transparent photographic pictures.
2355. A. Firth, Bradford—Imp. in furnaces for heating wheel hoops, applicable also for other similar purposes.
2356. J. Webster, Lee-crescent, Birmingham—Imp. in utilising the waste flux from galvanising works.
2357. J. Sturgeon, Leeds—Imp. in machinery for cutting and boring coal and rocks.
2358. W. Oxley, Manchester—Imp. in pickers for looms.

Dated 25th September, 1863.

2363. A. V. Newton, 66, Chancery-lane—An improved joint for the tubes of surface condensers. (A com.)
2364. P. Spence, Manchester—Imp. in the production of sulphocyanide of ammonium and other sulpho-cyanides.
2365. E. Lloyd, Dee Valley, near Corwen, Merionethshire—Imp. in rotary engines to be worked by water, steam, air, and other motive power.
2366. M. Schaffhauser, Cernay, France—Imp. in the machinery for making paper tubes used in spinning manufactories.

Dated 26th September, 1863.

2367. G. Spill, T. J. Briggs, and D. Spill, Hackney Wick—Imp. in the manufacture of driving straps or bands, and of flexible tubes or hose.
2368. W. T. Rowlett, 90, Welford-road, Leicester—Imp. in crinolines and hooped skirts.
2369. R. Clarke, Altringham, Cheshire—A new application of material for covering crinolines, and in the manufacture of the said material.
2370. W. Clark, 53, Chancery-lane—An improved fabric for the production of permanent electricity, applicable for wearing apparel. (A com.)
2371. J. Spence, Portsmouth—An improved plastic composition, applicable to the coating of metallic and other surfaces.
2372. A. Gleerup, Jewry-street—An improved construction of gas burner. (A com.)
2374. W. Malan, Walpole-street, Deptford, Kent, and W. Tice, Downham-road, Islington—Imp. in apparatus for supplying gas to railway carriages and other moving structures, and in apparatus for manufacturing and holding gas in ships and other vessels, parts of such apparatus being also applicable for manufacturing and holding gas elsewhere.

Dated 28th September, 1863.

2377. L. J. J. Jean, 22, Quai de l'Ecole, Paris—Imp. in the construction of steam boilers, and in their fire-grates.
2378. P. Bourchani, 14, Rue Geoffroy-Marie, Paris—An improved wax-light or candle stand.
2379. P. Cato, Liverpool—Imp. in the construction of combined iron and timber ships.
2380. J. T. Harlow, Upper Saltley, near Birmingham, and E. Harlow, Balsall Heath, Worcestershire—Imp. in breech-loading fire-arms.
2381. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus for heating by means of illuminating gas. (A com.)
2382. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of boot and shoe toe pieces or tips, and in the machinery or apparatus. (A com.)
2384. G. Thomas, 50, Chichester-villas, Kilburn-park—Imp. in Louvre shutters and Venetian blinds.

Dated 29th September, 1863.

2385. F. Preston, Manchester—Imp. in machinery for rolling and cutting files and rasps.
2386. F. G. Mulholland, 36, Essex-street, Strand—Imp. in the mode of manufacturing submarine telegraph cables, in apparatus connected therewith, and in the method or principle of laying the same, and in the preparation of the several compounds described for electric insulation and other purposes.
2387. S. Mendel, Manchester—Imp. in the manufacture of woven fabrics, applicable to covering telegraph wires.
2388. H. Haigh and R. Heaton, Milns-bridge, near Huddersfield—Imp. in dyeing cotton or other vegetable fibrous substances.
2389. W. Clark, 53, Chancery-lane—An imp. in the soles of boots and shoes. (A com.)
2390. W. E. Gedge, 11, Wellington-street, Strand—Imp. in parts of the permanent way of railways. (A com.)
2391. J. Cooper, St. Margaret's-green, Ipswich—Imp. in the construction of harrows.
2392. P. Llewellin, J. Llewellin, and J. W. James, Bristol—Imp. in water-closets.

Dated 30th September, 1863.

2393. J. J. Chidley, 11, Glaskin-street, Hackney—An improved bottle and stopper.
2394. W. Clark, 53, Chancery-lane—Imp. in musical instruments. (A com.)
2398. G. Elliot, Betley-hall, Staffordshire—Imp. in props and supports for coal and other mines.
2399. B. Browne, 49, King William-street, London-bridge—An improved sight-piece for rifles. (A com.)

Inventions with Complete Specifications Filed.

2397. E. W. Bullard, Massachusetts, U.S.—A new and useful machine or carriage for turning and spreading hay, and for other useful agricultural purposes.—30th September, 1863.
2401. J. Mackay, Aigburth, Lancashire—Certain imp. in fire-arms, ordnance, and projectiles.—1st October, 1863.

Patents Sealed.

[*From Gazette, October 9th*, 1863.]

9th October.

917. D. Mylrea.
920. W. Clark.
921. P. P. Baly.
922. A. F. Maclure.
931. M. Myers.
932. T. Mallinson and P. Williams.
935. G. T. Smith.
940. R. A. Brooman.
941. R. A. Brooman.
943. J. Leach.
945. T. Gray.
946. W. Clark.
949. W. Spence.
950. H. Eaton.
956. I. Baggs and W. Simpson.
959. W. Oldfield.
960. A. Samuelson.
963. R. Knight.
966. J. Goucher.
967. R. C. Clapham.
972. C. W. Siemens and F. Siemens.
976. G. A. Buchholz.
981. C. Blanc.
984. E. W. Hughes.
993. H. Donald.
998. F. E. Bryant.
1000. F. Durand.
1009. R. Richardson.
1027. J. H. Johnson.
1029. L. de Breanski.
1074. S. S. Marling.
1081. H. Worms.
1094. J. H. Johnson.
1095. J. M. Gray.
1115. J. H. Johnson.
1156. W. Clark.
1185. J. Shanks.
1242. H. Bennett.
1247. J. Beaumont.
1360. V. Baker.
1445. W. Wells and J. W. Myers.
1778. H. Mege.
2020. P. F. L. B. Him.
2069. J. Fleming.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, October 13th*, 1863.]

5th October.

2462. C. Wheatstone.
2468. R. Hornsby, jun.
2471. T. Whitby & W. Dempsey.
2499. J. J. Russell & B. L. Brown.

6th October.

2429. D. Cope.
5460. J. Ramsbottom.

7th October.

2442. E. Gardner.
2445. J. Edge.
2534. R. G. McCrum.
2792. J. S. Crosland.

8th October.

2457. G. Bonelli.
2501. J. Higgins and T. S. Whitworth.
2989. H. Jordan.

9th October.

2478. W. Barker.
2548. W. Andrews.

10th October.

2574. J. Wadsworth and J. Wadsworth.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, October 13th*, 1863.]

6th October.

2352. F. Whitehead.
2358. D. Joy and W. Holt.

7th October.

2405. T. Allen.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4579	Sept. 18.	The Chest, Back, and Spine Protector	Henry Gaball	7, Burlington-gardens. W.
4580	,, 24.	Design for Improvements in Lamps, for Burning Mineral Oils	J. S. Thomas and Co.	163, Fore-street, Exeter.
4581	,, 28.	Improved Water Tire Iron	Joseph Kenney	Birkenhead, Chester.
4582	,, 30.	Improved Wing Cape or Sleeve Cloak	H. J. and D. Nicoll	Regent-street, W.
4583	Oct. 6.	Handle for Carpet Bags, Portmanteaus, and other articles	James Parkes	Handsworth, Birmingham.
4584	,, ,,	Improved Brace Buckle	Charles Bowley	Newhall-street, Birmingham.
4585	,, 9.	Hooks for attaching Spark and Crinoline Guards for Fire Grates	Thos. Pinfold Hawkins	Birmingham.

Journal of the Society of Arts.

FRIDAY, OCTOBER 23, 1863.

ELECTION OF THE PRINCE OF WALES AS PRESIDENT.

A General Meeting of the members of the Society was held on Thursday, the 22nd instant, at 4 o'clock. The members assembled at Burlington House, as the Society's House in the Adelphi is at present undergoing repairs.

William Hawes, Esq., F.G.S., the Chairman of the Council, occupied the Chair.

The Secretary having read the notice convening the meeting,

The Chairman said:—I will commence the proceedings of this meeting by calling your attention to the fact that, at the first annual meeting of the Society after the lamented death of the Prince Consort, it was stated in the Council's report that we hoped to have the honour and advantage of the Presidency of His Royal Highness the Prince of Wales, so soon as a fitting time had elapsed since the death of his father. In the interval we elected as our President one of our oldest and most respected Vice-Presidents, Mr. William Tooke, and he filled the office until recently, when by his death it became vacant. We then thought it right to take steps for ascertaining whether the Prince of Wales would accept the Presidency, if elected by the members; we therefore sought for and obtained the honour of an interview with His Royal Highness, and presented an address, which, with His Royal Highness's reply, I will now read to you:—

To His Royal Highness the Prince of Wales.

May it please your Royal Highness,

We, the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce, humbly approach your Royal Highness, to ask that you will be graciously pleased to become a Member of the Society, with the view of being elected to the office of its President.

The Council can never forget the obligations of the Society to your illustrious father, who, for a period of eighteen years, presided over its proceedings with so much advantage, not only to the Society but to the country at large.

The establishment of International Exhibitions, and the comprehensive designs for connecting education in Science and Art with productive industry, were among the many thoughtful endeavours of His Royal Highness to promote the welfare of his adopted country.

The Council believe that your acceptance of this office will be a means of enabling your Royal Highness to promote and extend the enlightened views of your lamented father for the advancement of Arts and Manufactures, and the benefit of Her Majesty's subjects.

On behalf of the Council,
WILLIAM HAWES, Chairman.

His Royal Highness was graciously pleased to return the following reply:—

Gentlemen,—I thank you for your address. It is not without much diffidence that I venture to take on myself the office that has been offered to me in so flattering a manner, feeling that there are so many better qualified for it than I can pretend to be.

But it is the Queen's wish, being herself precluded from taking part personally in the proceedings of your Society, to mark, through me, the interest she feels in a body of which her beloved husband was so long the head.

On my own part, I am led to entertain the hope that, by accepting the situation of your President, I may be better able to promote the great and beneficent objects which my dear father had so much at heart, and in which he was so zealously supported by your Society.

Encouraged by this hope, and having no dearer wish than to assist in any way in my power towards the success of his great designs, I cannot refuse to accept the position so kindly offered to me.

I am sure you will all feel that the terms in which His Royal Highness has expressed the feelings of Her Majesty, as well as his own, towards this Society, are most gratifying. We cannot see the son of so distinguished and illustrious a parent succeed to the chair which the Prince Consort filled with so much distinction and so much usefulness, without looking back to the progress of the Society, and recalling to mind the various Presidents who have preceded him. We have had the honour of being presided over in succession by members of the Royal Family. His Royal Highness the Duke of Sussex was for many years President, and during his presidency the Prince Consort was Vice-President. He succeeded to the chair at the death of the Duke of Sussex. And now, having unfortunately lost this illustrious Prince, who presided over us for so long a period, we have come here to elect as his successor a young man, comparatively untried, but whose education has been such that we have every reason to believe that he inherits from his father the same desire to do good to the working classes of this country, the same desire to promote the encouragement of art in connection with manufactures, and the same anxiety to make himself really useful, and to follow in the footsteps of his father as an earnest promoter of Arts, Science, and Literature; and we hope that, some years hence, we shall be as proud of his Presidency as I believe we all are of the Presidency of his illustrious father.

Immediately upon receiving His Royal Highness's answer, the Council summoned this meeting. By the ordinary rules of the Society, before a member can be elected he must be proposed, and his name suspended for a certain period. We felt sure that you would agree with us, that to pass His Royal Highness through such an ordeal as that, after the answer I have just read to you, would not be respectful to him, or in accordance with your feelings. We therefore thought it right to call you together, and ask you at once to suspend all the bye-laws relating to the election of members and officers, and to submit his name to you to be at once elected a member of the Society. Having done that it will be my duty to bring forward another proposition, that he be elected our President. In that, again, the Council, bearing in mind the feelings of all the members as well as their own, did not consider they would be doing their duty if they used the powers given to them by the bye-laws to elect a President till the next Annual Meeting. They, therefore, thought it due to you that you should exercise your power, that the whole body of members should have an opportunity of expressing how cordially they appreciate the very kind and flattering terms used by His Royal Highness in the reply which I have just read, and also the gratitude we owe to Her Majesty for her gracious expression of sympathy with the proceedings of this Society. The first step to be taken is the purely formal one of suspending for this occasion the bye-laws relating to the election of members and officers. I will therefore propose :—

"That the bye-laws relating to the election of members and officers be suspended for this meeting."

This having been unanimously passed,

The Chairman proposed :—

"That His Royal Highness the Prince of Wales be elected a member of this Society."

This resolution having also been passed unanimously,

The Chairman said he would next propose :—

"That His Royal Highness the Prince of Wales be elected President of this Society."

This was passed by acclamation.

A vote of thanks to the chairman was then proposed by Mr. Joseph Payne, seconded by Mr. Teulon, and carried unanimously.

THE WATCH TRADE OF GENEVA.*

It is a matter of some interest to inquire whether the manufacture of watches in Geneva is likely to remain in its present state of depression, or whether, from certain causes to which it has been subject for a time, this depression will disappear with the unfavourable circumstances which caused it.

It would be almost impossible for any person unconnected with watch-making to arrive at a correct view of the case, viz., of the great amount of industry, and of the vast quantity of watches which are annually manufactured in Geneva. The difficulty arises from various causes, but chiefly from this, that it is not imperative to have the Government stamp engraved on each watch. This mode of testing the exact number of watches made in the city would, therefore, prove erroneous, and, even if obtained, would not be satisfactory, as a good many case-makers and engravers work for Neuchâtel, where they send their unfinished watches, which claim afterwards no other origin but that of Geneva, though they may have no right to it.

The result of any inquiries made at the office of the public taxes would be equally fallacious, as it is not likely that the real number of watches made is ever stated by the makers.

The only way of getting as near the truth as possible is by basing your calculations upon certain data current among the manufacturers themselves, and knowing the number of watches which some of them produce annually, and the number of workmen employed by others. You may thus arrive at the total number of watches manufactured, which, though not an easy task, may still be achieved by anyone thoroughly versed in the matter, and not afraid of tedious researches.

It should be observed that in such an inquiry great care must be taken not to mistake for Geneva manufacture the goods sold by those manufacturers who get all their watches from Neuchâtel, a practice by no means uncommon. The city of Geneva does not manufacture one-fifth part of the watches which are manufactured in the Canton of Neuchâtel; the small city of Chaux-de-Fonds alone (whose inhabitants are all watchmakers), yearly makes twice as many watches as Geneva does.

After the political events which disturbed all Europe in 1848, the trade of watch-making was thoroughly paralysed in Geneva, and seemed, for some time, past revival. Money and credit were equally wanting, and the workmen employed before that time in the great manufactories became so utterly destitute that they were nearly driven to desperation.

The Government took every measure in their power to ameliorate this alarming state of things, and, seeing the utter hopelessness of trying to revive this particular branch of industry, for which there was at the time no market, they created the national "chantiers," where every citizen could find a retreat against starvation by becoming carpenters, roadmakers, hedgers or ditchers, &c. These national "chantiers" gave work to an immense number of hands during two years. In 1850 they were reduced in number, from the fact that the trade of watch-making appeared to revive in some degree. The greater part of the manufacturers re-opened their workshops, but they set to work with extreme circumspection, the political horizon being still very far from encouraging. It was then that the evil results of what had been for the time a means of salvation became evident. Those men who had left their quiet and comparatively easy work, to take to the trowel and spade for a certain length of time, and who, during that time, had, for the greater part, adopted the loose habits of common labourers, had become totally unfit for their former trade; some had lost the taste, some the neatness of hand required for such work, and all were dissatisfied. It is supposed that the city of Geneva did not issue more than 30,000 watches in the year 1850.

In 1851 the London Exhibition gave new vigour to this industry. The workmen took heart, and an immense number of watches were made; fresh markets were opened; North and South America offered a vast field to traders; watches were sent from Geneva to all parts of

* This information has been furnished by one of the Geneva watch-makers.

Europe and elsewhere: Russia, Turkey, Egypt, were inundated by them, as well as India. Not less than 60,000 watches were manufactured in Geneva in the year 1851.

The years 1852 and 1853 were similar to 1851, with this difference, that the markets of North America having become more and more extensive, and their demands for watches more and more important, the Genevese manufacturers threw themselves wildly upon these new hopes, increasing the extent of their trade to irrational limits, and sending their goods to America in enormous quantities. And it is to be observed that the goods thus sent were not only those that American merchants bought or ordered, but were goods sent conditionally to commissioners of whose respectability or solvency nothing whatever was known to the manufacturers, who risked sometimes their whole fortune on such frail probabilities of payment. Numberless agents started up in the principal cities of North America—New York, Boston, Philadelphia, New Orleans, and even San Francisco had their agents, whose demands for watches were unlimited and extravagant.

As happens in everything of the same kind, these first years of success brightened the hopes of all manufacturers, and everyone seemed to believe that a new era was beginning for the prosperity, not only of Geneva, but of all those cities of Switzerland whose chief trade lies in watch-making. In 1855 an enormous number of watches were made and new agents set up in Paris and elsewhere, as they had done in America.

We may here state that during the disastrous years 1848-51, public banks had been created, with a view of affording accommodation on easier terms to those manufacturers who wanted funds. Among these establishments were, the Bank of Geneva, the Caisse d'Escompte, the Swiss Bank, &c., which principally supported watchmakers; but, unfortunately, the Caisse d'Escompte, on which the manufacturers had built their greatest hopes of renewed prosperity, soon became their ruin. The mode of payment between manufacturers and workmen underwent a gradual change; payments were no longer made in cash; bills and drafts were circulated to an enormous amount, and the meanest workman had an account opened in the Swiss bank, or the Caisse d'Escompte, where he could negotiate his bills.

The Crimean war was beginning to tell in the shape of scarcity of money and scarcity of demands for watches from the East. Goods were sent off to the American agents more rashly than ever; and some manufacturers even had recourse to the mode of having their conditional accounts with these agents negotiated in public banks, at whatever loss to themselves, as long as they could find ready money to get out of their entangled affairs.

The years 1856-57 passed in much the same manner; but the "Caisse d'Escompte," which had seemed to rise above the other banks, suddenly stopped its payments; a great number of manufacturers became, consequently, embarrassed, others insolvent, and all their hopes turned again, though in a less degree, towards America and Italy. Geneva and Neuchâtel were struggling against each other for the sale of their watches; Neuchâtel lowered its price, and shortly afterwards they sank so low that Neuchâtel watches were to be bought in New York for only 5 francs more than they had cost to the maker.

The "Comptoir d'Escompte" seemed for a time to replace advantageously the "Caisse d'Escompte," but again this assistance was of short duration; a great number of manufacturers were beginning to slacken their way of working—some, out of straitened circumstances; others, out of tardy prudence. America paid badly, and yet goods were still rashly sent to all its markets.

In 1858-59, the Italian war did much injury to Geneva. American payments became still less certain. Amongst the manufacturers very few were able to obtain money on their bills from public banks; a great many tried to sell off their stock, but that had become impossible.

At Neuchâtel other means of rescue were tried. The "Union Horologère" was created, and a Society for the Exportation of Watches, both of which had agents in every city of Europe, in China, in India, in America, and, in fact, all over the world. These associations sold watches at such reduced prices that it was impossible to compete with them, inasmuch as the laws of Geneva forbid the sale of any watches whose gold is not in proportion of $\frac{750}{1000}$, or 18 carats; whereas in other cities of Switzerland gold may be worked in an unlimited proportion to other metals, as no legal control is placed over it, and consequently at much less cost, though, of course, with a proportionate inferiority.

In 1859, work was slackened to nearly the half of the preceding years; in 1860, it did not come up to the third of the same amount; and in that same year, 1860, the creation of the "warrants"* struck a deadly blow at a great portion of the Geneva manufacturers. In 1861 this state of things continued. A great number of shops—engravers', case-makers', &c.,—were compelled to close their doors and pay off their workmen. This was principally the case with those firms who worked for Neuchâtel.

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To sum up it may be stated that the great facility offered for procuring money has been the ruin of many Genevese watchmakers. The illusory help they found in these deceitful transactions affected others equally; the encumbrances were only displaced, but not removed; and this fallacious security tempted them out of the limits of all prudence to launch them into the most hazardous speculations. All the great markets are overflowing with Geneva watches. In London, New York, Paris, Constantinople, Odessa, St. Petersburgh, Swiss watches may be bought for less than their original cost to the maker; and during a certain period good watches have been sold in New York at half-price, and even for their weight of gold.

After having thus stated the lamentable decrease in its prosperity under which Geneva has been and is still labouring, let us proclaim our firm belief in the complete and inevitable revival of that prosperity, a belief founded on our own experience of the subject, and on the following reasons:—

1. As before stated, no Geneva watches are allowed to be sold except at a high standard of gold, which is a guarantee for their excellence and solidity; and though an inferior price may, for the time being, allure inexperienced buyers, still the inferiority in the goods always shows itself, and enhances the value of the superior watches; and this, in the end, brings the buyers to the best makers.

2. In what is called "bad years," Geneva will, proportionately, make more watches than Neuchâtel; for although its prices are twice as high, the superiority of them is always known; and it would be easy to prove by

* The institution of the "warrants"—no other than the pawnbroking of goods—is now in Geneva entirely in the hands of usurers, for the following reasons:—Formerly the Geneva watchmakers had very few bills in circulation; but since the creation of the public banks this kind of transaction increased immensely, and became far too much for the means of those merchants and of the public banks themselves who encouraged these transactions, because they proved beneficial to them. Some bankers were beginning to lend money on the security of the warrants, but the very fact of resorting to this means of procuring money proving injurious to the merchants in the opinion of their bankers, affairs of this kind were soon done on a more secret footing, to avoid the discredit they entailed upon those who resorted to them, and money was procured by the warrants entirely from Jews, who lent it at a heavy per-centage. Another deplorable consequence of this system, besides the impossibility of answering demands for sale which it brought upon those who parted with most of their goods on such terms, has been to lower to an extreme degree the price of watches in Geneva, as, in cases were the goods were not duly redeemed, they have been sold at public auctions sometimes for less that half-price.

figures that Geneva finds market for its watches more easily than does Neuchâtel for its inferior goods. The consequence of this is that, at the greatest depression of the trade, Geneva suffers still less than Neuchâtel, and, consequently, preserves more strength and means to carry on the struggle against adverse circumstances.

The following is the number of watches turned out by Geneva in the last eleven years:—

In the year 1850	....	30,000 watches
,, 1851	....	70,000 ,,
,, 1852	....	70,000 ,,
,, 1853	....	80,000 ,,
,, 1854	....	80,000 ,,
,, 1855	....	70,000 ,,
,, 1856	....	70,000 ,,
,, 1857	....	60,000 ,,
,, 1858	....	60,000 ,,
,, 1859	....	60,000 ,,
,, 1860	....	40,000 ,,
,, 1861	....	30,000 ,,
Total	....	720,000 ,,

After all, a manufacturing city which has issued so many watches in a space of eleven years, is not quite paralyzed, and 720,000 are large figures. There seems every reason to hope that Geneva will rise again; for never, in its brightest days, has it issued more than 60,000 watches annually on an average. It will rise again, and more easily than may be expected by inexperienced judges, who are not aware of all the resources, perseverance, and elasticity of the working classes, with which a long experience has made the writer of this acquainted, and in which he is fully confident for the revival of this national industry as soon as external circumstances (which seem already less unfavourable) will allow fair play to the industrious workmen and the enterprising watchmakers.

LAW ON TRADE MARKS.—The Canton of Geneva has lately passed a law making it matter of prosecution to fraudulently use trade-marks of any kind, whatever may be the insignia adopted by a manufacturer. The adoption of a trade-mark is made optional; the owner to deposit two copies of such mark with the Tribunal de Commerce of Geneva, and the proprietorship of it to be good for fifteen years, with power of renewal on making a second deposit. This precaution seems to be necessary, otherwise the parties aggrieved will not be able to lay their complaint before the Tribunal; for Article III. says, "Nul ne peut revendiquer la propriété exclusive d'une marque s'il n'a déposé deux exemplaires du modèle de cette marque au Greffe du Tribunal de Commerce." The present law may be considered as resulting from the literary and artistic Convention concluded with France at the end of 1858, as the XIXth Article expressly says:—

"Les Etats Contractants ayant reconnu en outre l'utilité d'appliquer aux travaux de l'industrie la protection qu'ils octroient par la Convention actuelle à ceux de l'art et de l'esprit, considéreront désormais les marques de fabrique comme compris dans ces derniers, et en assimileront en conséquence la réproduction sous tous les rapports, à la contrefaçon artistique et littéraire.

"Les marques destinées à assurer la propriété industrielle des ressortissants de l'une ou de l'autre des Parties Contractantes seront disposés, en ce qui concerne l'industrie Genevoise, au greffe du Tribunal de Commerce de Paris, et en ce qui touche l'industrie Française, entre les mains de l'autorité Genevoise chargée par la loi de recevoir les dépôts semblables des industriels indigènes."

In the beginning of 1859, Geneva was willing to conclude a similar Convention with England, but, at the time it was not responded to. There can be no doubt that for our watchmakers, whose names are being constantly forged, not so much, perhaps, by Geneva as Neuchâtel, it would be very important to be able to lay hold of the offender before his own tribunals, and so tend to put a stop to an evil of which our people loudly complain.

In order to comprehend the whole bearing of the law, I give it as it stands in the original:—

"*Loi sur les Marques de Fabrique*" (*du 5 Avril*, 1862).

"Article 1. La marque de fabrique ou de commerce est facultatif.

"Toutefois, la loi peut exceptionnellement la déclarer obligatoire pour les produits qu'elle détermine.

"Art. 2. Sont considérés comme marques de fabrique ou de commerce les noms sous une forme distinctive, les dénominations, emblèmes, empreintes, timbres, cachets, vignettes, reliefs, lettres, chiffres, enveloppes, et tous autres signes servant à distinguer les produits d'une fabrique ou les objets d'un commerce.

"Art. 3. Nul ne peut revendiquer la propriété exclusive d'une marque s'il n'a déposé deux exemplaires du modèle de cette marque au Greffe du Tribunal de Commerce.

"Art. 4. Le dépôt n'a effet que pour quinze années.

"La propriété de la marque peut toujours être conservée pour un nouveau terme de quinze années, au moyen d'un nouveau dépôt.

"Art. 5. Sont considéré comme coupable d'usurpation de marque de fabrique ou de commerce:—

"1. Ceux qui ont contrefait une marque ou fait usage d'une marque contrefaite;

"2. Ceux qui ont frauduleusement apposé sur les produits ou les objets de leur commerce une marque appartenant à autrui;

"3. Ceux qui ont sciemment vendu ou mis en vente un ou plusieurs produits revêtus d'une marque contrefaite ou frauduleusement apposée.

"Art 6. Peuvent être poursuivis comme coupables de la même usurpation:—

"1. Ceux qui, sans contrefaire une marque, en ont faite une imitation frauduleuse de nature à tromper l'acheteur, ou ont fait usage d'une marque frauduleusement imitée;

"2. Ceux qui ont fait usage d'une marque portant des indications propres à tromper l'acheteur sur la nature du produit.

"3. Ceux qui ont sciemment vendu ou mis en vente un ou plusieurs produits revêtus d'une marque frauduleusement imitée ou portant des indications propres à tromper l'acheteur sur la nature du produit.

"Celui qui intentera une action en vertu du présent Article devra prouver le dol ou l'intention frauduleuse du prévenu.

"Art. 7. Les délits d'usurpation de marque de fabrique ou de commerce seront, en ce qui concerne l'action correctionelle, considérés comme des faits ayant pour but de tromper l'acheteur sur la nature de la chose vendue, et passibles des peines prévues à l'Article 423 du Code Pénal.

"Art. 8. Le Parquet ne poursuivra les faits relatifs à l'usurpation des marques de fabrique ou de commerce que sur la demande des intéressés.

"Art. 9. Les personnes dont la marque de fabrique ou de commerce aurait été usurpée peuvent réclamer la poursuite correctionelle en adressant une plainte au Parquet, ou se pourvoir simplement devant les Tribunaux Civils, pour obtenir des dommages-intérêts proportionnés au tort qui leur a été causé."

BRITISH ASSOCIATION, NEWCASTLE, 1863.

ON THE RAILWAYS AND LOCOMOTIVES OF THE NORTHERN DISTRICT. BY JOHN FURNESS TONE, C.E.

The district comprised within the boundaries of the northern coal-field has been the seat of mining operations for the supply of the metropolis and the South of England from a period very remote as compared with the general opening out of the coal-fields of Wales and Derbyshire, and long ere the canals which were formed to connect the Midland coal-fields with their respective

markets were constructed, the produce of this coal-field was brought on tramroads to the Tyne, and there shipped.

Owing to the physical configuration of the coal-fields of Northumberland and Durham, the mines were situated for the most part at considerable altitudes above the river Tyne,—being placed, as it were, on the sides of the valley, thereby rendering the introduction and use of the canal system a matter of so much difficulty that, notwithstanding its general adaptability to the cheap conveyance of heavy loads, the produce of our northern coal mines continued to be led to the banks of the river on these tramroads long after the general introduction of the canal system elsewhere.

The history of the progress of the railway system, like that of other great mechanical improvements, is a record of difficulties encountered, acting as a spur to invention, and eventually resulting in successful improvement; and it may fairly be said that to the necessities of the Newcastle coal trade the world is indebted for its railways.

The early tramroads seldom exceeded two or three miles in length; they were in use 260 years ago, and were constructed mostly of oak and beech timber; and of this last extensive woods are in existence in the upper portions of the county of Northumberland, planted apparently about 120 years ago, up to which period the demands for timber for these tramroads had not entirely ceased.

Wooden tramroads were in general use till about 1780, although cast iron rails were first used about 1770, but up to this time the use of cast iron rails still continues in some of the older private railways; these, however, are now almost always replaced with wrought iron as they are worn out, and may soon become matters of history.

The conversion of the wooden tramroads into iron ones was the first great step in the improvement of railways which (after the introduction of wrought iron rails in 1820) assumed their present shape, so far as the general principles of construction were concerned.

So completely has this country now been intersected with railways, public and private, that on an area of about 666 square miles, comprised in the northern coal-field, there are only 122 square miles, or about one-fifth of the whole, at a greater distance than one mile, and only 221 square miles, or one-third of the whole, at a greater distance than half-a-mile, from a railway, public or private.

The total length of the private railways in the entire district is 287 miles; the public railways constructed for the more immediate service of the district, and exclusive of main lines as under, comprise 387 miles; making together 674 miles.

The foregoing mileage of public railways is exclusive of those portions which have been constructed for more general purposes, and which, as before mentioned, have not both of their termini within the district, thus excluding from the calculation the main line from Darlington to Berwick, the Newcastle and Carlisle, South Durham and Lancashire, Border Counties and Wansbeck Railways.

The complete reticulation of the district by means of these railways will be understood from the circumstance that within the actual limits of the coal-field itself, comprising about 666 square miles, there are (including all lines general and local) 609 miles of railway, occupying about 6,000 acres of land, being nearly one mile of railway for each square mile of surface of the northern coal-field, in addition to the 1,300 miles of underground railway, as estimated by Messrs. Wood and Taylor, in their paper which has been already read on this occasion.

Previous to the introduction of tramroads, the old pack-horse conveyed 3 cwt., at three miles per hour, and travelled on an average about eight miles with his load.

The cost of this mode of conveyance was about 1½d. per cwt. per mile, or 30d. per ton per mile.

The introduction of macadamised roads increased the horse load from 3 cwt. to 18 cwt., and with the same mileage performed, the 30d. was reduced to 8½d. per ton per mile.

On the early wooden tramroads a horse averaged a load of two tons, further reducing the cost of haulage to 3¾d. per ton per mile.

The immediate cost of actual haulage on private railways, exclusive of interest and capital on waggons as before, in cases where horses, inclines, and fixed engines are intermixed, as circumstances require, and with quantities varying from 80,000 to 160,000 tons per annum, is found to amount to 0·7d. per ton per mile.

The cost by leading with a locomotive engine, costing 38s. per day, and with a load of 126 tons net on the ordinary local railways of the North of England, and in gradients reaching up to 1 in 100, travelling with a load about thirty-five miles per day, exclusive also of interest of engine and railway, and of waggons as before, amounts to about 0·11d. per ton per mile.

And on first-class gradients, and under most favourable circumstances, with loads of 350 tons, a mileage of 60 payable miles, at a cost of 48s. per day, this haulage may possibly be reduced to 0.03d. per ton per mile, but this can but rarely be maintained in actual working.

Taking even 0·1 of a penny as being the cost of the mechanical effect required to lead a ton of coals on a railway by locomotives, we have reduced the cost to 1-300th part of that by pack-horses, and to 1-37th part of the cost of wooden tramroads.

In order, however, more fully to estimate the relative commercial value of the different modes of haulage, as practised in these northern coal-fields, it will be necessary to include the other elements of expense, such as interest of capital, maintenance, and the cost of the different descriptions of railway required in each case, and to compare the entire cost of the locomotive system with that of fixed engines and inclines, as practised extensively in these districts.

1st. By horses, fixed engines, and inclines intermixed, with traffics varying from 80,000 to 160,000 tons per annum, including waggons, maintenance and renewals (and with interest on cost of line at £1,500 per mile), the total expense of leading coals is found to amount to an average of 1·1d. per ton per mile.

This is exclusive of cost of land, or of way leaves paid in lieu thereof.

2nd. By fixed engines and inclines, without horse power, this expense, including as before, with a yearly traffic up to 400,000 tons, and a distance up to seven miles, the total cost amounts to 0·54d. per ton per mile.

The particulars of this mode of leading are as follows, viz.:—Engines, inclines, and maintenance of way, in all 0·43d. per ton per mile. Interest and cost of railways and plant, 5 per cent. per annum; rates and contingencies, exclusive of land, 0·11d. per ton per mile; making, as above, 0·54d. per ton per mile. By locomotives, and on railways of improved construction, including, as before, this cost with loads of about 126 tons, and with gradients up to 1 in 100, amounts on an average of railways to 0·44d. per ton per mile, as under, viz.:—The cost of maintaining and working a heavy locomotive engine, including repairs, coke, water, stores, wages, &c., amounts in one year, on an average, to £600; to this must be added interest on capital, viz., £2,300 at 5 per cent., £115, making the gross cost of an engine per annum £715, or say £720 per annum.

But to maintain three engines in working order on a railway, four must be kept, and this reduces the available number of working days to 234 throughout the year, costing 61s. for every day an engine works on the line, and travelling 35 payable miles with a load of about 120 to 130 tons, gives the locomotive power in conveyance of minerals at the rate of about 12 to 15 miles per hour, the sum of 0·17d. per ton per mile. To this must be added the cost of waggons, and interest thereon, amounting to 0·125d. per ton per mile; add interest, maintenance, and renewals of way, rates, &c., amounting in all to 0·222d. per ton per mile on a load of 800,000 tons; making the cost

of leading by locomotive power, with full employment, 0·517d. per ton per mile.

Thus it will be seen that the locomotive system, although capable of carrying a much greater mineral traffic, is not on the whole more economical than fixed engines and inclines, as now used in this district, unless in large traffic; indeed, where the traffic does not exceed 400,000 tons, and unless the gradients are 1 in 100, or better, the fixed engine has the advantage. As the gradients improve or deteriorate the locomotive gains or loses respectively, and at a million tons has a superiority.

The history of the rise and progress of the manufacture of locomotive engines especially connects itself with Newcastle-upon-Tyne. The large manufactories of Messrs. Stephenson and Hawthorn have for many years been, and continue to be, of the highest repute.

In 1825, Messrs. Stephenson turned out the first locomotive on the Stockton and Darlington Railway; and in 1829 completed the Rocket.

It is a remarkable circumstance that, notwithstanding the lapse of 34 years, during which the manufacture of locomotives has increased at a rate almost without precedent in similar matters, yet in the general principles of mechanical construction the present most improved locomotive remains very closely analogous to the Rocket.

The leading features of the Rocket were as follows:—Cylinder: diameter, 8in.; stroke, 14 in.; driving wheels, 4ft. 8in.; trailing wheels, 2ft. 10in.; heating surface, 144 square feet; weight of engine, 4¼ tons; weight of tender, 3¼ tons; horse power, 40; evaporating power, 18·24 cubic feet water per hour; coke, per cubic foot water evaporated, 11·7lbs.; maximum speed, 29 miles per hour; average speed, 13·8 miles per hour.

In the largest narrow guage engines now constructed, the heating surface has been increased from 144 to 1,620 square feet, or 12 times that; the weight of an engine from 4¼ tons to 38 tons; the horse power from 40 to 1,300.

Since the commencement of the manufacture of locomotives, about 2,400 have been turned out by the manufacturers of Newcastle, and upwards of 900 of these have been sent abroad.

Taking an average cost of £2,000 from the commencement to this time, the gross value of the exported locomotives from Newcastle amounts to £1,800,000. Adding those manufactured for use in Great Britain and Ireland at £1,500, would give a further sum of £2,700,000; making the gross value of the locomotives from Newcastle to amount in all since the commencement of the manufacture to £4,500,000. Of the £4,500,000, nearly one-half is represented by material purchased by the manufacturers in various stages of completion; thus work to the value of upwards of £2,000,000 has been furnished by the manufacturers of Newcastle to the other branches of industry connected with their trade.

FINE ARTS APPLIED TO INDUSTRY.

In the Palais de l'Industrie, in the Champs Elysées, Paris, an Exhibition of the Fine Arts applied to industry has lately been opened. This remarkable Exhibition has been organised by a committee of private individuals, eminent in their industries, presided over by the Baron Taylor, member of the Institute, and Commander of the Legion of Honour, and is held in connection with *La Société des Inventeurs et des Artistes Industriels*, and authorised by the Minister of State. The Exhibition is open every day, on payment of twenty-five centimes (2½d.) on Sundays, of one franc on Saturdays, of half a franc on all other days; any surplus to be handed over to the *Société des Inventeurs*. The Committee, in their preface to the catalogue, call attention to the speech of the Emperor, made last January, on the occasion of the distribution of the medals awarded at the Exhibition of 1862. The Emperor said, "Individual exertion, working with unflagging energy, renders it unnecessary for Government to be the sole promoter of the vital forces of a nation.

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Call into action the individual energy of each for all that is beautiful and useful. Such is your task." These pregnant words of the "crowned thinker," addressed to the *élite* of French workmen, say the Committee, have not been slow in bearing fruit, for without their influence the Committee feel assured that such a response to their appeal could not have been attained as the present exhibition shows, from so many men holding the first rank in Art Industries, as well as from artists of European reputation. The exhibition, as the offspring of individual enterprise, is itself a novelty in France, and a grand success. In it are shown for the first time, say the Committee, side by side, the vigorous productions of mature age and the attempts of youth, it may almost be said of infancy. As a preparation for the future, the organisers of the exhibition have invited the Schools of Design of Paris and the Departments to join in the Exhibition, and the Empress, to encourage the idea, has placed at the disposal of the jury, on the part of the Prince Imperial, five gold medals, as prizes for the students in these schools. Nearly fifty schools exhibit the work of their students. The building placed at the disposition of the Committee by the government affords ample space for a large number of exhibitors, who have taken advantage of the opportunity, and the Committee feel that such displays as these cannot fail to educate the public, the artist, and the workman, to appreciate the combinations of artistic genius and labour, and will thus lead on to a gradually improving future. The classification of the works shown is as follows:—

1. Architecture:—Plans, designs, materials formed by art and industry.
2. Statuary. Sculpture:—Marble, terra cotta, wax, alabaster, original bronzes, granite, porphyry, &c. Reduced figures modelled in plaster, after ancient and modern masters.
3. Ornamental Sculpture:—Mouldings, decorations for art industries.
4. Painting and drawing applied to decoration and art industries.
5. Paper hanging, embossed leather, &c.
6. Carpets, tapestry, and upholsterers' work.
7. Furniture of artistic character in various woods, carved or gilt, marquetry, mosaic, bronzes, lacquer ware, and new applications of iron.
8. Bronzes of artistic character for furniture, and for lamps. Imitation bronzed zinc; gilding on zinc. Artistic works in lead and copper. Artistic castings in iron. Artistic locksmiths' work.
9. Goldsmiths' work, jewellery, and works in silver gilt.
10. Painting on porcelain; enamels.
11. Ceramic:—Porcelain, china ornaments, &c.
12. Glass, mirrors, and windows.
13. Blinds; artificial flowers.
14. Church furniture and decorations.
15. Woven fabrics of every kind, for furniture, decoration, and domestic use, clothing, and the toilet, deriving their value from beauty of design and colour.
16. Fire arms, side arms, and cutlery.
17. Musical instruments.
18. Various industries, small pieces of furniture, shelving, *Articles de Paris*, dolls, &c.
19. Scientific industries:—Clocks, mechanical, optical, and geographical instruments, &c. Specimens of natural history.
20. Engraving on metals; ancient and modern methods. Letter engraving. Engraving on wood, lithography, chromo-lithography, autography, and heliographic engraving.
21. Photography.
22. Books and publications relating to the Fine Arts, their history and teaching by means of public buildings; archæology, furniture, decoration, &c.

PRINTING FOR THE BLIND.

The blind, of necessity, read by the touch. The method of printing in raised letters originated, as stated, with Valentin Haüy, in Paris, in 1784. Since then various kinds of embossed letters and characters have been adopted. The alphabetical systems are known as the Roman capitals, as in the books printed in the Glasgow and Pennsylvania institutions; the combined capital and lower case, as in books from the Bristol, Paris, and some of the German institutions; and the angular lower case, of the Massachusetts institution.

The arbitrary systems are known as Braille's in France; Carton's in Belgium; Lucas's, Frere's, and Moore's in England. Both systems have their peculiar advantages. While some institutions adopt the principle that the alphabets and all tangible apparatus should conform as nearly as possible to those universally in use by the seeing, it must be conceded that the simple arbitrary characters of Braille, Lucas, and others, are more readily learned by the adult blind and those whose touch has become less sensitive by work.

Books for the blind are quite limited in number and dear. Of the principal works of this character may be named—the whole Bible, printed at the Glasgow Asylum, in 19 volumes, quarto, £9 10s.; the whole Bible, in 8 large vols., price £4; a cyclopædia, 8 large volumes (unfinished); Milton's Poetical Works, 2 volumes; Paley's Evidences, 1 volume; Combe on the Constitution of Man, 1 volume; Philosophy of Natural History, 1 volume; Rudiments of Natural Philosophy, 1 volume; Lardner's Universal History, 3 volumes; Common Prayer, 1 volume; Pope's and Diderot's Essays, 1 volume, and other works from the Boston Institution. A dictionary of the English language, 3 large volumes; Select Library, 5 volumes; Church Music, 3 volumes; Student's Magazine, 6 volumes, and other works from the Philadelphia Institution. History of the United States, 3 volumes, and several other works from the Virginia Institution. These and some volumes of moderate extent from the Bristol and London presses are all in the alphabetical type. The New Testament, and portions of it and part of the Old, have been printed and duplicated several times in the three arbitrary characters of Lucas, Frere, and Moore, used in England.

While these various arbitrary systems do credit to the ingenuity of the inventors, two of whom are blind, it is unfortunate, considering the paucity of embossed books, that the efforts of the friends of the blind have not been concentrated upon some one or two kinds of print.

The great object of all institutions for the education of the blind is to remove the disabilities under which they labour, as far as possible, by substituting the sense of touch for the lost sight; by a correct system of moral, mental, and physical training, and by giving them a knowledge of music or some useful mechanical art to prepare them for the active duties and enjoyments of life. Without deciding how their mental and physical condition will compare with the general standard, it is demonstrated that they have capacities for receiving a good education in the various departments of useful knowledge, and of becoming church organists and piano instructors. The largest number become practical workmen in several branches of plain handicraft. While the cultivation of music is to them a source of the greatest delight, and is almost universally taught to the younger blind as affording a benevolent compensation for the loss of all that is beautiful in nature, the exercise of the industrial powers supplies to the mass of the blind the great necessity of their condition. Occupation of mind and body in all these respects gives to the blind in the public institutions that tone of cheerfulness which is considered so remarkable in their condition.

But the great result is the preparation of the blind for self-support when they return to become members of the community. It is for this end that private bounty and legislative aid have been so generously granted in the United States. While the young blind are admitted for a term of years to receive an education in the school and music departments, in connection with handicraft, adults at all ages under 50 are received in some of the institutions for a period of one or two years to acquire a simple trade, when they go on their way rejoicing in their ability to support themselves, or at least to remove the necessity of an entire and hopeless dependence on their friends or the public.

In Europe thousands of blind persons are paupers in the poor houses or burdens upon friends, who would be able, if instructed in simple trades, to earn a large part of their support. Many adult blind in the United States are in the same dependent condition. This number is being partially provided for by those institutions which receive adults.

The employment of the graduate blind by existing institutions is a subject of interest in the United States as in Europe. It is certain that many worthy and industrious blind persons fail to support themselves fully. How far and in what way they may be aided by existing institutions or by others organised for their welfare is an important question, claiming and receiving serious attention by those prepared to judge practically upon the subject.

CASTOR-OIL.

The castor-oil plant has been known from the remotest ages. Caillard found the seeds of it in some Egyptian sarcophagi, supposed to have been at least 4,000 years old. Some people imagine it is the same plant that is called the *gourd* in Scripture. It was called *aporane* by the Greeks, and *ricinus* by the Romans. It is a native of India, where it sometimes grows to a considerable size, and lives several years. When cultivated in Great Britain, it is an annual, seldom exceeding three or four feet. There appears to be several varieties of the *ricinus*, the officinal or the *Ricinus communis, or Palma Christi.*

The seeds are oval, somewhat compressed, about four lines long, three lines broad, and a line and a half thick; externally they are pale grey, but marbled with yellowish brown spots and stripes.

The oil may be obtained from the seeds by expression, by boiling with water, or by the agency of alcohol. Nearly all that is consumed in England is obtained by expression.

In America the seeds cleansed from the dust and fragments of the capsules are admitted to a gentle heat, not greater than can be borne by the hand, which is intended to render the oil more liquid, and therefore more easily expressed. The whitish oily liquid thus obtained is boiled with a large quantity of water, and the impurities skimmed off as they rise to the surface. The water dissolves the mucilage and starch, and the albumen is coagulated by the heat, forming a layer between the oil and water. The clear oil is now removed, and boiled with a very small quantity of water, until aqueous vapour ceases to rise, and a small portion of the oil taken out in a phial remains perfectly transparent when cold. The effect of this operation is to clarify the oil, and to get rid of the volatile acid matter. Great care is necessary not to carry the heat too far, as the oil would thus acquire a brownish colour and acid taste.

In the West Indies the oil is obtained by decoction, but none of it appears in commerce in this country.

In Calcutta it is thus prepared:—The fruit is shelled by women; the seeds are crushed between rollers, then placed in hempen cloths, and pressed in the ordinary screw or hydraulic press. The oil thus obtained is afterwards heated with water in a tin boiler until the water boils, by which means the mucilage and albumen are separated. The oil is then strained through flannel and put into canisters.

Two principal kinds of castor seeds are known, the large and the small nut; the latter yields the most oil. The best East Indian castor-oil is sold in London as "cold drawn."

In some parts of Europe castor-oil has been extracted from the seeds by alcohol, but the process is more expensive, and yields an inferior article.

Castor oil is a viscid oil, generally of a pale yellow colour, a nauseous smell and taste. Its specific gravity, according to Saussure, is 0·969 at 53° Fah. The acid taste which it sometimes possesses may be removed from it by magnesia (Gerhardt.) At about 6° F. it forms a yellow, solid, transparent mass. By exposure to the air, it becomes rancid, thick, and at last dries up, forming a transparent varnish. It dissolves easily in its own volume of absolute alcohol; castor oil and alcohol exercise a mutual solvent power on each other. It is also soluble in ether.

There are chiefly three sorts of castor oil found in the London market; viz., the oil expressed in London from imported seeds, East Indian oil, and the American or United States castor oil. Castor oil is imported in casks, barrels, hogsheads, and dappers. It is purified by decantation and filtration, and bleached by exposure to sunlight.

It is not quite decided how many kinds of fats castor oil contains; according to Gerhardt several, but Saalmuller says only two. It is, however, principally composed of *ricinobeine*, with perhaps a little stearine and palmatine, and an acid resin. Its ultimate composition is shown by the following analysis:—

Carbon	74·00	74·18	74·35
Hydrogen	10·29	11·03	11·35
Oxygen	15·71	14·79	14·30
	100·00	100·00	100·00

When castor-oil is heated in a retort to 500° F., an oleaginous liquid distils over, without the liberation of much gaseous matter; about the third part of the oil thus passes over. If after this it is further heated it froths up, but if the distillation is stopped before it begins to froth up, there remains in the retort a substance insoluble in water, alcohol, ether, the fatty and essential oils; this is treated with ether to remove any undecomposed castor-oil, then dissolved in potash; the soap thus formed yields a fatty acid, viscid at ordinary temperatures, very soluble in absolute alcohol, but little soluble in weak spirit. The volatile products of the distillation contained *ananthole*, *ananthylic acid*, some *acrobeine* and solid fatty acids.

Hyponitric acid solidifies castor-oil, and nitric acid when boiled with it converts it into ananthylic and suberic acids.

Castor-oil is said to be adulterated sometimes with croton oil to increase its activity; this is a dangerous sophistication. It is also mixed with some cheap fixed oils. The latter adulteration has been said to be detected by the solubility of castor-oil in alcohol, but unfortunately castor-oil may contain as much as 33 per cent. of another fixed oil, and yet be soluble in its own volume of alcohol, this oil possessing the property of rendering other oils soluble in spirit.

AMERICAN FIRE ARMS.

The Superintendent of the U.S. Census, in his preliminary report, states: — Our improved fire-arms, especially rifles and pistols, have obtained a reputation not alone in Europe, but in Africa, Asia, and the islands of the sea; the travellers find that new revolvers of American invention and manufacture exert a salutary influence on the Bedouin and the robber.

The machinery for making the various parts of rifles and other fire-arms, which, in its automatic exercise, seems almost endowed with reasoning faculties, owes its origin to the inventive genius of New England. The Enfield rifle was transplanted to England by a son of Vermont, under whose superintendence the arms were made. And even the Armstrong gun, which obtained for its reputed inventor the honour of knighthood, was invented in this country, for a model was submitted, and the principle demonstrated, to scientific gentlemen at Harvard College, anterior to its appearance in Great Britain.

In the year preceding June 1, 1860, a year devoted to peaceful pursuits, the manufacture of fire-arms was limited, and yet two establishments in a single city of Connecticut produced to the value of over one million of dollars. Had the national inventory been taken two years later, the magnitude of this, and kindred branches of manufacture stimulated by the necessities of the country, would have excited astonishment.

The first rifles made by machinery to use the Minie ball, or its equivalent, were made at Hartford, Connecticut, and Windsor, Vermont, for the English Government. The machinery and tools for the armoury at Enfield (England), were made at Windsor, Vermont; Hartford, Connecticut; and Chicopee, Massachusetts. Robbins and Lawrence did most of the work on such machinery and tools, and James T. Ames, agent to the Chicopee works, got out the stocking machinery and some other parts.

ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

The report for July says, that during the month there have been examined 324 engines and 450 boilers. Of the latter, 17 have been examined specially, 11 internally, 55 thoroughly, and 367 externally; in addition to which 3 of these boilers have been tested by hydraulic pressure. The following defects have been found in the boilers examined:—Fracture, 8 (2 dangerous); corrosion, 16; safety-valves out of order, 9, (2 dangerous); water gauges ditto, 21; pressure gauges ditto, 8; blow-out apparatus ditto, 37; fusible plugs ditto, 2; furnaces cut of shape, 4; over pressure, 1 (dangerous); deficiency of water, 1 (dangerous); blistered plates, 3; Total 110 (6 dangerous). Boilers without glass water gauges, 2; without blow-out taps, 38; without back pressure valves, 41. The number of thorough examinations of boilers is steadily increasing.

One explosion during the month, of a very fatal character, by which ten persons were killed and four others injured, occurred to an ordinary mill boiler of the two-flue "Lancashire" class. This boiler was not under the inspection of the Association.

The dimensions were as follows:—Length 30 feet, diameter of the shell nearly 7 feet 6 inches, and that of the furnace tubes—which were parallel throughout, and not strengthened by any hoops or flanges—2 feet 8 inches; the thickness of the plates in the shell and tubes, seven-sixteenths, in the flat end plates half an inch, each of them being strengthened with three gusset stays, secured with double angle irons.

The longitudinal seams in the shell were not laid in line, but disposed so as to break joint. The age of the boiler was about two years. It had not been tested by hydraulic pressure.

The boiler had been fitted with a single lever safety-valve, the valve being enclosed in a box bonnetted over, from which the waste steam escaped through a discharged pipe, carried through the wall of the boiler house. It had also been fitted with a glass water gauge—a feed-check and back-pressure valve combined, fixed to the front end plate, a little below water level—a blow out or mud tap, and a steam pressure gauge, of the dial class; but the boiler had no tap for fixing an indicator, so as to check the accuracy of the gauge, and ascertain the actual working pressure with the steam up.

The boiler was rent into so many fragments by the explosion, that it was completely destroyed, while considerable damage was also done to the surrounding property. Both the furnace tubes were torn away from the end plates, as well as separated into two pieces, dividing at one of the transverse seams in the middle of their length. Three of these lengths, weighing upwards of a ton each,

were blown over a row of cottages, one alighting on the first floor of a dwelling beyond, having broken the roof in its fall, the other two lengths falling at intermediate distances between these two rows of buildings; while the fourth flew in a direction nearly at right angles with the others, and also fell upon a cottage, carrying in the roof. The safety-valve weight, which was a ball of about 8 inches diameter, was shot upwards, and, on its fall, broke through the roof of a third cottage. The shell of the boiler had been torn up into so many small pieces that it was difficult to trace the course of the rents, and to determine where they had first commenced; but it may be remarked, that one of them ran through the manhole, which was not strengthened as it should have been by a substantial mouth-piece.

The evidence given at the inquest, as well as the examination of the furnace-crowns, forbids the conclusion that the explosion was caused by a deficiency of water; while, further, the fact that the shell which should have been stronger than the tubes, rent into a number of small pieces while the tubes did not collapse, shows that the explosion was not due to excessive pressure, but to the defective quality of the plates of which the boiler, on examination, was found to have been made.

In conclusion, attention is specially called to the following points:—

The contradictory nature of the evidence too frequently admitted at coroners' inquests as to the cause of boiler explosions.

The short-sighted economy of purchasing low-priced boilers, erroneously termed "cheap," which leaves the maker no alternative but to use plates of an inferior quality, a practice not only detrimental to the interests of the steam user, but also unfair to the honest boiler maker.

The importance of having all boilers thoroughly tested with hydraulic pressure; this had never been done with the boiler under consideration; had the test been applied, there can be little doubt that the inferior quality of the plates would have been detected, and the explosion prevented.

The August report says, that during the month there have been examined 313 engines and 401 boilers. Of the latter, 6 have been examined specially, 9 internally, 45 thoroughly, and 341 externally, in addition to which 2 of these boilers have been tested by hydraulic pressure. The following defects have been found in the boilers examined:—Fracture 5 (1 dangerous); corrosion, 14; safety-valves out of order, 7; water-gauges ditto, 9 (1 dangerous); pressure gauges ditto, 15; feed apparatus ditto, 2; blow-out apparatus ditto, 27; fusible plugs ditto, 1; furnaces out of shape, 4 (1 dangerous); over-pressure, 3; deficiency of water, 1 (dangerous). Total, 88 (4 dangerous). Boilers without glass water gauges, 3; without blow-out apparatus, 16; without back pressure valves, 25.

Nine explosions have occurred during the month, from which five persons have been killed and three others injured. Not one of the boilers in question was under the inspection of the Association. In one case the boiler had been repaired with bolted patches. These, when necessary, should always be riveted on, as no reliance can be placed upon those merely bolted. At the time of the explosion there were three of these patches on the boiler, within 12 inches of one another. The surrounding plate at length became so eaten away by continual leakage, that it was reduced in places to one-eighth of an inch in thickness, and in others to that of a sheet of brown paper, from which rupture ensued underneath the boiler, at the back end, immediately over the midfeather; the midfeather, no doubt, accelerating the corrosion, by ponding the water, and holding it in contact with the plate, at the same time that it concealed the full extent of the injury. Competent inspection could not have failed to detect the dangerous condition of the boiler.

Considerable irregularity is met with in the manner in which many of the boilers under inspection are set. The external brickwork flues of some are so contracted as to be altogether inaccessible, so that no examination of the plates can be made; of others, the side flues are of very unequal area, thus unfairly diverting the draught; of others, again, they are carried dangerously high, being considerably above the low water level; while in some cases longitudinal seams of rivets run right along the bearing surface of the brickwork seating, which not only accelerates corrosion of the plates, should leakage take place, but at the same time time conceals the injury, so that it frequently goes on to a dangerous extent undetected.

Home Correspondence.

THE WHITWORTH RIFLE.

Sir,—It may be interesting to some of your readers to know that a wheel-lock gun, with the true Whitworth bore, bearing the undoubted date of 1636, may be seen at Mr. Soper's, a gunmaker of Reading.

It is evidently a single-handed gun, the butt being supported upon a projection or indentation of the breastplate or cuirass of the armour of that period. The stock is ebony, inlaid with gold, an elegant and expensive piece of workmanship, and the weapon has been in Mr. Soper's family time out of mind. I am, &c.,

HENRY W. REVELEY.

Reading, October 21st.

Proceedings of Institutions.

Hull Young People's Christian and Literary Institute.—The report for last year congratulates the members that the income from subscriptions has exceeded that of any former year. The entire receipts from all sources have been considerably in excess of the general expenditure, and the Committee have been enabled to pay off about £40 of the debts of preceding years. There is still, however, a large sum which was owing when the Committee came into office, and which it is hoped the Institute will be enabled gradually to liquidate. The financial arrangements of the year have been conducted by a sub-committee, and it is recommended as a permanent regulation that this department be carried on by a similar committee, acting in conjunction with the officers. In order further to facilitate the business of this arrangement, the payment of half-yearly or yearly subscriptions is earnestly urged by the committee for adoption by the members, trusting that by a little effort and forethought the younger members will not experience any difficulty in the proposed change. The number of members is 1,250, viz.:—Honorary members, 310; ordinary members, 600; ordinary subscribers, 280; lady subscribers, 60. The different departments of the Institute are mostly in a very satisfactory state. The library contains 800 volumes, 150 of which have been added during the year. The special lecture arranged for by the Committee produced a nett receipt of £12, increasing the library to the extent of 100 volumes. The books circulate very largely, the issues having exceeded those of previous years. It is in contemplation to make still further efforts to provide the Institute with a library suitable to its wants. The Discussion Class has not—except during discussions of more than ordinary interest—been attended by large numbers. The Elocution and Reading Class, conducted upon the self-help and mutual improvement principles, has been of great benefit to its members. The Latin, German, French, and Phonetic Classes, are in full vigour under their respective teachers. The Bible Class has proved of high value to many of those who attend, holding on its even way, without any special characteristic. Attention is directed to the weekly *Journal of the Society of Arts*, containing, as it does, papers of great value, and much information of a scientific character. The annual excursion

of the Institute took place in July, when by the kindness of the Duke of Newcastle, Clumber House and grounds were thrown open to the members and friends. The excursion, besides being highly gratifying to all who accompanied it, was a source of pecuniary profit to the Institute. The Institute Cricket Club, formed for the exclusive use of the members, and under the management of a separate Committee, was vigorously carried on during the summer, and proved no inconsiderable adjunct to the Institute.

Lockwood Mechanics' Institution.—The eighteenth annual report for last year says that the state of affairs is unsatisfactory and discouraging. The number of members, the attendance in the classes, and the contributions are all considerably less than those of previous years; and this must continue to be the case until a new building be erected, which shall offer more inviting and comfortable accommodation to the young people of the district. The Committee still entertain the hope of being able to erect a new hall, suitable in all respects for the purposes of a Mechanics' Institution, and they rely upon the generous liberality of the large mill-owners and other employers of labour being exercised in furtherance of so desirable an object. The number of members at the end of the year was—males, 93; females, 26; total, 119. There are eight classes for males, taught by seven paid and two voluntary teachers, besides four classes for females, taught by three paid teachers, and one voluntary teacher. The number of books in the library is 576, and the issues during the past year have been 854 volumes. Special subscriptions, to the amount of £26 4s., have been collected by the Rev. T. B. Bensted, M.A., and Mr. Nathaniel Berry, and thus the Institution has been relieved from its somewhat embarrassed financial position. The expenditure has been £119 19s. 10½d., and there is a small balance due to the treasurer.

PATENT LAW AMENDMENT ACT.

Applications for Patents and Protection Allowed.

[*From Gazette, October 16th*, 1863.]

Dated 10th July, 1863.

1725. T. Legg, Northampton-square, and R. Griffith, Exmouth-street—Imp. in the construction of sewing machines.

Dated 28th July, 1863.

1869. R. Dawson, 16, Craven-street, Strand—An improved method of annihilating or extinguishing fires.

Dated 19th September, 1863.

2306. L. F. Chezand, 3, Rue des Capucins St. Jacques, and H. J. Christen, 6, Rue Neuve d'Orleans, Paris—Imp. in printing postage stamps, bankers' bills, shares, and other similar documents, and in machinery employed therein.

Dated 22nd September, 1863.

2334. G. M. de Bayelt, 16, Stamford-street, and J. E. Pigoulète, 22, Pitt-street, Fitzroy-square—An improved method of compounding by agglomeration artificial fuel.

Dated 30th September, 1863.

2395. H. E. Skinner, Shadwell—A new kind of conical packing for taps.

Dated 1st October, 1863.

2405. F. Reid, Liverpool—Collecting or saving the spirit or alcohol generated by spontaneous fermentation in raw sugar, concrete, melado, and molasses, and thrown off during the process of boiling or refining.
2407. W. E. Newton, 66, Chancery-lane—Improved apparatus for cleaning rice and other grain. (A com.)
2409. P. Leslie, M.D., M.R.C.S., 8, Windsor-terrace, Eastbourne, Sussex—Imp. in preserving the bottoms of ships or vessels and other surfaces from the prejudicial effects of marine animals and vegetables.

Dated 2nd October, 1863.

2413. J. E. F. Ludeke, 2, Stonefield-street, Islington, and M. Fisher, 28, Rue Taitbout, Paris—Imp. in obtaining motive power.
2415. J. Tees, Glasgow—Imp. in packing for stuffing boxes and pistons.
2417. W. E. Gedge, 11, Wellington-street, Strand—An improved pen holder and feeder. (A com.)
2419. W. A. Torrey, 17, Water-street, Liverpool—Imp. in lubricating the axles of railway carriages. (A com.)
2421. G. Shepherd and W. T. Shepherd, Great Grimsby, Lincolnshire—Imp. in restoring the crystals of lump or refined sugar which has been divided by saws, and in apparatus employed for this purpose.

Dated 3rd October, 1863.

2423. J. Schofield, J. Kirk, and W. Spivey, Huddersfield—Imp. in looms for weaving.
2425. E. B. Wilson, 10, Strand—Imp. in the manufacture of iron and other metals and in the apparatus employed therein, parts of which are applicable for other purposes where high temperatures are employed, and also for ventilation.
2427. E. Pratt, Nottingham—Imp. in finishing woollen fabrics made on twist lace machinery.

Dated 5th October, 1863.

2429. W. Hoehl, C. Brakell, and W. Gunther, Oldham—Imp. in rotary engines worked by steam, water, or other motive power.
2431. J. M. Stanley and J. Stanley, Sheffield—Imp. in propelling.
2433. J. W. Guilmette, Manchester—An improved substitute for whiting, pipe clay, and other analogous substances to be employed to produce a white coating or surface.
2435. G. H. Ellis, Wellington-road, Bromley, Middlesex—Imp. in, and application of, apparatus for aiding the combustion of fuel.
2437. T. Ivory, Edinburgh—Imp. in steam engines and in furnaces and boilers for the same.
2439. R. Pepper, Saville-street, Sheffield—An improved machine for pressing or crushing spent hops.

Dated 6th October, 1863.

2441. S. Mathews, Birmingham—Imp. in breech-loading fire-arms.
2445. W. Batchelour, Finsbury-pavement—An improved apparatus for moulding and modelling palates, teeth, and gums for dental purposes.
2447. A. Johnston, Comely-bank, near Edinburgh—Imp. on railway carriages.

Dated 7th October, 1863.

2451. J. Caddick, Birmingham—Imp. in the manufacture of runners, runner notches, and top notches for umbrellas and parasols.
2453. C. P. Button, 27, Leadenhall-street—Imp. in lamps, especially applicable to the burning of hydro-carbons. (A com.)
2455. C. P. Button, 27, Leadenhall-street—Imp. in harrows. (A com.)
2457. A. Rigg, jun., George-street, Chester—Imp. in apparatus for propelling vessels.
2459. J. Gibson, Ryhope Colliery, Sunderland—Imp. in cast iron pit tubing.
2461. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the permanent way of railways. (A com.)

Patents Sealed.

[*From Gazette, October 16th*, 1863.]

16th October.

978. P. G. Rowell and H. Holt.
985. A. Ford and R. Rigg.
986. H. Rafter.
988. E. L. Simpson.
990. M. Runkel.
991. J. W. Nottingham.
992. H. Yeadon, E. Yeadon, S. Yeadon, and J. Yeadon.
996. W. Campion and G. Wilson.
997. W. Ryan and W. Daniel.
999. T. Settle.
1005. J. Lee and E. Dawson.
1012. T. Richardson and J. C. Stevenson.
1014. J. Cavanah.
1015. J. B. Daines.
1016. W. N. Wilson & J. G. Grey.
1023. J. Thompson.
1024. J. Thompson.
1028. C. Pooley.
1030. S. Harrison.
1038. C. Beyer.
1039. I. Dimock.
1089. W. Clark.
1105. S. J. Bartlett.
1111. J. M. Johnson, E. Johnson, C. Johnson, and L. Bertling.
1113. G. Haseltine.
1123. J. H. Knott.
1126. S. B. Cochran.
1147. J. B. P. A. Thierry.
1288. W. E. Newton.
1289. W. E. Newton.
1327. W. E. Newton.
1369. A. V. Newton.
1420. J. G. Jones and R. Ridley.
1650. F. Ransome.
1807. F. J. Mavor.
2059. T. Howard.
2061. G. T. Bousfield.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, October 20th*, 1863.]

12th October.

2491. M. Strang.
2496. R. A. Brooman.
2497. M. Deavin.

13th October.

2651. W. T. Vose.

14th October.

2503. G. Davies.
2510. A. McDougall.
2514. P. R. Smith.
2544. A. V. Newton.
2654. W. E. Newton.
2676. C. Harratt.

15th October.

2525. W. Henderson & J. Down.
2528. W. Clarke and S. Butler.

16th October.

2538. T. J. Marshall.
2547. J. Macintosh.

17th October.

2552. J. Thompson, E. G. Fitton, and F. A. Fitton.
2553. J. Jack and D. Rollo.
2555. C. Hoare.
2558. J. Burch.
2561. W. Jamieson, W. Robinson, and C. Rowbottom.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, October 20th*, 1863.]

12th October.

2114. G. Collier.

14th October.

2462. H. Deacon.
2494. L. A. Desachy.

16th October.

2443. L. J. P. de Mirimonde.

17th October.

2419. E. Tombs.

Journal of the Society of Arts.

FRIDAY, OCTOBER 30, 1863.

NOTICE TO MEMBERS.

The One-Hundred-and-Tenth Session of the Society will commence on Wednesday, the 18th November, at 8 o'clock, when William Hawes, Esq., F.G.S., Chairman of the Council, will deliver the Opening Address. The Chair will be taken at eight o'clock on the following Wednesday evenings:—

1863. November	—	—	18	25	
„ December	2	9	16	—	—
1864. January	—	—	20	27	
„ February...........	3	10	17	24	
„ March..............	2	9	16	—	30
„ April	6	13	20	27	
„ May................	4	11	18	25	
„ June	—	—	—	29*	

For the Meetings previous to Christmas the following arrangements have been made:—

November 18.—Opening Address by William Hawes, Esq., F.G.S., Chairman of the Council.

*** *On this evening the Prince Consort's Prize, awarded at the last Examination, and the Prizes awarded to the Art-workmen who were successful competitors at the Wood-carving Exhibition held in June last, will be distributed.*

November 25.—"New South Wales, and its Commercial Resources." By Sir Charles Nicholson, Bart.

December 2.—"On Magneto-Electricity, and its Application to Lighthouse Purposes." By F. H. Holmes, Esq.

December 9.—"Recent Agricultural Progress and its Causes." By J. Chalmers Morton, Esq.

December 16.—"On the Economic Value of Foods, having special reference to the Dietary of the Labouring Classes." By Dr. Edward Smith, F.R.S.

The Council have made arrangements for the delivery of Courses of Lectures on the following subjects during the ensuing Session:—

Fine Arts Applied to Industry. By W. Burgess, Esq.
Chemistry Applied to the Arts. By Dr. F. Crace Calvert, F.R.S.
International Commerce. By G. W. Hastings, Esq., Barrister-at-Law.

These Lectures will be open to Members and their Friends on the same conditions as the Ordinary Meetings. Particulars of the Courses will be duly announced.

THE WEDGWOOD INSTITUTE.

The foundation stone of an Institute about to be erected at Burslem to the memory of Josiah Wedgwood, who died in 1797, was laid by the Right Hon. W. E. Gladstone on Monday, the 26th inst

The present scheme of the Wedgwood Institute was mooted so long ago as 1858, but it had to contend with various difficulties. These, however, have been now happily surmounted, and a liberal sum has been subscribed, an appropriate site close to Wedgwood's birthplace and his old works has been purchased, the requirements of the government have been complied with, so that a handsome grant may be confidently looked for, and Mr. Ewart's Public Libraries and Museums Act has been adopted by the ratepayers almost without a dissentient voice. This measure will authorise the levying of a penny rate for the support of the Institution, and it is estimated that it will yield not less than £200 a year. The design for the building is by Mr. G. B. Nicholls; but at a conference of the subscribers held in February last, Mr. A. J. B. Beresford Hope suggested that premiums should be offered for the adornment of the principal façade in ceramic work, with mouldings in terra cotta, panels of della robbia, or mosaics in tessera, and these will form an important feature in the decoration of this building. Its internal arrangements seem to be all that can be desired in point of convenience. They will comprise schools of art, both for male and for female students, a free public library, a library of reference, a museum, and a modelling room.

At one o'clock the Chancellor of the Exchequer entered the tent under which the ceremony was to take place, and he was received with enthusiastic cheering. There were present Earl Granville, the Bishop of Lichfield, Viscount Ingestre, Mr. Lowe, M.P., Mr. Adderley, M.P., Sir James Duke, M.P., Mr. Grenfell, M.P., Mr. Ewart, M.P., Mrs. and Miss Gladstone, &c.

The proceedings were commeuced by the presentation of an address to the Chancellor of the Exchequer, which was duly acknowledged.

The foundation stone was then laid with the usual ceremonies, prayer having first been offered by the Bishop of Lichfield.

Mr. Gladstone then read the following paper:—We have now laid this stone in honour of Josiah Wedgwood, with a view, as I hope, to the permanent and effectual benefit of the people of his birthplace. The occupations and demands of political life compel many of those who pursue it, and myself among the number, to make a rule of declining all invitations of a local character, except such as lie within their own immediate and personal sphere; but when I received, through one of your respected representatives, an invitation to co-operate with you in the foundation of the Wedgwood Institute, I could not hesitate to admit that a design of this kind was, at least in my view, not a local, but, when properly regarded, rather a national design. Partly it may be classed as national, because the manufacture of earthenware in its varied and innumerable branches is becoming, or has indeed become, one of our great and distinguishing British manufactures. But it is for another and a broader reason that I desire to treat the purpose you have now in hand as a purpose of national rather than merely local or partial interest. It is because there are certain principles applicable to manufacture by the observance or neglect of which its products are rendered good or bad. These principles were applied by Wedgwood with the consistency and tenacity that cannot be too closely observed. These principles, being his and being true, were also in no small degree peculiar to his practice, and deserved to be in the permanent annals of art especially associated with his name. I am engaged, as I am aware, in a somewhat perilous undertaking, for, having to speak to you about a man and a business, I am obliged to begin by confessing what, if I did not confess it, you would soon discover for yourselves, namely, that of both of them my knowledge is scanty, theoretic, and remote, while you breathe the air, inherit the traditions, in some cases bear the very name of the man, and have a knowledge of the business, founded upon experience and upon interest in all its turns and stages, and from its outer skin, so to speak, to its innermost core. It is the learner who for the moment stands in the teacher's place, and instead of listening with submission seems to aim at speaking with authority. It would be easy to enlarge in this course of remark, but I

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

must stop, or I shall soon demonstrate that I ought not to be here at all. Let me then offer something on the same side. First, I have to assure you that whatever I shall say I submit with entire deference to the judgment of those who are better informed, and with a full confidence that if erroneous it will be corrected, and if false exploded. Secondly, as an observer, according to my limited capacity and means, of fictile manufacture in its various branches, I have formed deliberately so very high an estimate of Wedgwood in relation not merely to his particular business, but to the general laws of industrial production, that I am glad to have an opportunity of stating it fully and fairly in order to bring it to trial by the public judgment; and thirdly, in the office which I hold as a servant of the Crown, and which places me in incessant contact with the industry of the country in its several branches, I am anxious, from the deep interest which I feel in its welfare, to bear my testimony to the principles of which Wedgwood was, so to speak, an apostle, and moreover to give to that testimony any little weight which such an office, and such a deep interest and near relations established by it, may be likely, in the absence of higher qualifications, to impart. Thirty years ago it would probably have been held by many, and it may still be the thought of some, that the matters of which I have now to speak are matters which may well be left to regulate themselves. To vindicate for trade in all its branches the principle and power of self-regulation has been for nearly a quarter of a century a principal function of the British parliament. But the very same stage in our political and social existence which has taught us the true and beneficial application of the laws of political economy, has likewise disclosed to us the just limits of the science, and of the field of its practical application. The very same age which has seen the State strike off the fetters of industry, has also seen it interpose with boldness for protection of labour. The same spirit of policy which has taken from the producer the enjoyment of preferences, paralysing to him and most costly to the community at large, has offered him the aid of knowledge and instruction, by whatever means either of precept or example public authority could command. We may consider the profits of industry with reference to their utility or to their cheapness, or to their influence upon the condition of those who produce them; or, lastly, to their beauty—to the degree in which they associate the presentation of forms and colours agreeable to the cultivated eye, with the attainment of the highest aptitude for those purposes of common life for which they are properly designed. Now, as to their utility and convenience, considered alone, we may leave that to the consumer, who will not buy what does not suit him. As to their cheapness, when once security has been taken that an entire society should not be forced to pay an artificial price to some of its members for their productions, we may safely leave the question to the action of competition among manufacturers, and of what we term the laws of supply and demand. As to the condition of the work-people, experience has shown, especially in respect to the factory acts, that we should do wrong in laying down any abstract maxim as an invariable rule. Generally, it may be said, that the presumption is always against legislative interference, but that upon special grounds, and most of all where children are employed, it may sometimes not only be warranted but required. This, however, though I may again revert to it, is not for to-day our special subject. We come, then to the last of the heads which I have named—the association of beauty with utility, each of them taken according to their largest sense in the business of industrial production. And it is in this department that I conceive we are to look for the peculiar pre-eminence, I will not scruple to say the peculiar greatness, of Wedgwood. Do not let us suppose that when we speak of this association of beauty with convenience we speak either of a matter which is light and fanciful, or of one which may, like some of those I have named, be left to take care of itself. Beauty is not an accident of things. It pertains to their essence, it pervades the wide range of creation, and wherever it is impaired or banished, we have in this fact the proof of the moral disorder which pervades the world. Reject, therefore, the false philosophy of those who will ask, "What does it matter, provided a thing be useful, whether it be beautiful or not?" and say, in reply, that we will take our lesson from Almighty God, who in His works hath shown us, and in His Word also hath told us, that "He hath made everything"—not one thing or another thing, but everything—"beautiful in his time." Among all the decrees of creation, there is not one more wonderful—whether it be the movement of the heavenly bodies, or the succession of the seasons and the years, or the adaptation of the world and its phenomena to the conditions of human life, or the structure of the eye or hand, or any other part of the frame, of man—not one of these is more wonderful than the profuseness with which the mighty Maker has shed over the works of His hands an endless and boundless beauty. And to this constitution of things outward the constitutional mind of man, deranged although it be, still answers from within. Down to the humblest condition of life, down to the lowest and most backward grade of civilization, the nature of man craves, and seems as it were even to cry aloud for something—some sign or token, at the least, of what is beautiful in some of the many spheres of mind or sense. It is that which makes the Spitalfields weaver, amid the murky streets of London, train canaries and bulfinches to sing to him at his work, that fills with flowerpots the windows of the poor, that leads the peasant of Pembrokeshire to paint the outside of his cottage in lively colours, and prompts in the humbler classes of women a desire for some little personal ornament, certainly not without its dangers (for what sort of indulgence can ever be without them?), yet sometimes, perhaps, too sternly repressed from the high and luxurious places of society. We trace the operation of this principle yet more conspicuously in a loftier region; in that instinct of rational and Christian piety which taught the early masters of the fine arts to clothe the noblest objects of our faith, and especially the idea of the sacred person of our Lord, in the noblest forms of beauty that their minds could conceive, or their hands could execute. It is, in short, difficult for human beings to harden themselves at all points against the impression and the charm of beauty. Every form of life that can be called in any sense natural will admit them. I know not whether there is any one among the many species of aberration that renders a man so entirely callous as the lust of gain in its extreme degrees. That passion, where it has full dominion, excludes every other. It shuts out even what might be called redeeming infirmities, it blinds men to the sense of beauty as much as to the perception of justice and right. Cases might be named of countries where greediness for money holds dominion, and where unmitigated ugliness is the principal characteristic of industrial products. On the other hand, I do not believe it extravagant to say, that the pursuit of the element of beauty in the business of production will be found to act with a genial chastening and refining influence on the commercial spirit; that up to a certain point it is in the nature of a preservative against some of the moral dangers that beset trade and manufacture and enterprise, and that we are justified in regarding it not merely as an economical benefit—not merely as contributing to our work an element of value—not merely as supplying a particular faculty of human nature with proper food, but as a liberalising and civilising power, and an instrument in its own sphere of moral and social improvement. Indeed, it would be strange if a deliberate departure from what we see to be the law of nature in its outward sphere was the road to a close conformity with its innermost or highest laws. But now but let us not conceive that, because the love of duty finds for itself a place in the general heart of mankind, therefore we need never make it the object of special attention, or put in action special means to promote and uphold it. For, after all, our attachment to it is a matter

of degree, and degree which experience has shown to be in different places and at different times indefinitely variable. We may not be able to reproduce the time of Pericles or of the Cinque Cento, but yet it depends upon our own choice whether we shall or shall not have a title to claim kindred, however remotely, with them. What we are bound to is this, to take care that everything we make shall in its kind and class be as good as we can make it. When Dr. Johnson—whom Staffordshire must ever place among her most distinguished ornaments—was asked by Mr. Boswell how he had attained to this extraordinary excellence in conversation, he replied that he had no other rule or system than this, that whenever he had anything to say he tried to say it in the best manner he was able. It is this perpetual striving after excellence on the one hand, or the want of such effort on the other, which more than the original difference of gifts, contributes to bring about the differences we see in the works and characters of men. Such efforts are more rare in proportion as the object in view is higher, the reward more distant. In the application of beauty to works of utility the reward is generally distant. A new element of labour is imported into the process of production, and that element, like others, must be paid for. In the modern publication which the firm of Wedgwood and Bentley put forth under the name of a catalogue, but which really contains much sound and useful information on the principles of industrial art, they speak plainly on this subject. They say:—"There is another error common with those who are not over well acquainted with the particular difficulties of a given art. They often say that a beautiful object can be manufactured as cheaply as an ugly one. A moment's reflection would undeceive them." The beautiful object would be dearer than one perfectly bare and bald, not because utility is compromised for the sake of beauty, but because there may be more manual labour, and there must be more thought in the original design. Therefore the manufacturer, whose daily thought must and ought to be to cheapen his productions, endeavouring to dispense with all that can be spared, is under much temptation to decline letting beauty stand as an item in the cost of production. So the pressure of economical laws tells severely on the finer elements of trade. And yet it may be argued that, in this as in other cases—in the case, for example, of durability and solidity—that which appears cheapest at first is not cheapest in the long run. And this for two reasons. In the first place, because in the long run mankind are willing to pay a price for beauty. France is the second commercial country in the world, and her command of foreign markets seems clearly referable in a great measure to the real elegance of her productions, and to establish in the most intelligible form the principle that taste has an exchangeable value. But there seems to be another way by which the law of nature arrives at its revenge upon the short-sighted demand for cheapness. We begin, say, by finding beauty expensive; we decline to pay artists for producing it. Then employment ceases, and they disappear. Presently we find that works reduced to utter baldness do not satisfy. We have to meet a demand for embellishment of some kind, but we have starved out the race who knew the laws and mode of its production. We substitute strength for flavour, quantity for quality, and we end by producing incongruous excrescences, or hideous malformations, at a greater cost than would have sufficed for the nourishment among us of chaste and virgin art. So the penalty of error may be certain, but the reward of sound judgment and right action, depending as it does not on to-day or to-morrow, but on the long future, is remote. In the same proportion it is wise to call in aid all the secondary resources we can command. Among these instruments, and among the best of them, is to be reckoned the foundation of institutes like this, for they not only supply the willing with means of instruction, but they bear witness from age to age to the principle on which they are founded. They carry down the tradition of good times through the slumber and the night of bad times, ready to point the path to excellence, when the dawn returns again. I heartily trust the Institute may be one worthy of its founder and of its object. But now let us draw nearer to the immediate character and office of him whom I may call our hero. His most signal and characteristic merit lay in the fineness and fulness of his perception of the true law of what we term industrial art, or, in other words, of the application of the higher art to industry. The law which teaches us to aim first at giving to every object the greatest possible degree of fitness and convenience for its purpose, and next, at making it the vehicle for the higher degree of beauty which compatibly with that fitness and convenience it will bear; and does not substitute the secondary for the primary end, but recognises as part of its business the duty to harmonise the two. To have a strong grasp of this principle, and to work it out in its results, in the details of a vast and varied manufacture, is praise high enough for any man. But it was higher and heartier in the case of Wedgwood than any other man. For that truth of art which he saw so clearly, and which lies at the root of excellence, was one of which England has not usually had a perception at all corresponding with her other rare endowments. She has long taken lead among the nations of Europe for the cheapness of her manufactures. Not so for their beauty; and if the day shall ever come when she shall be as eminent for taste as she is now for economy of production, my belief is that that result will probably be due to no other single man in so great a degree as to Wedgwood. This part of the subject, however, deserves a fuller consideration. There are three regions given to man for the exercise of his faculties in the production of objects, and the performance of acts conducive to civilisation and to the ordinary uses of life. Of these, one is the homely sphere of simple utility. What is done is done for some purpose of absolute utility or immediate use. What is produced is produced with an almost implicit regard to its value and exchange, to the market, the place, and day. A dustman cannot be expected to move with the grace of a fairy, nor can his cart be constructed on the flowing lines of a Greek chariot of war. Not but that even in this unpromising domain, beauty also has her place. Then, there is the lofty sphere of pure thought and its ministering organs, the sphere of poetry and the highest arts. Here, again, the place of utility is narrowed, and the production of the beautiful in one or other of its innumerable forms is the supreme if not the only object. I believe it to be undeniable that in both of these spheres, widely separated as they are, the faculties of Englishmen and the distinctions of England have been of the very first order. In the power of economical production she is at the head of all the nations of the earth. If in the fine arts—in painting for example—she must be content with a second place —yet in poetry, which ranks even higher than painting, she may fairly challenge all the nations of Christendom, and none but Italy can as yet enter into serious competition with the land of Shakspeare. I for one should admit that while thus pre-eminent in the pursuit of pure beauty on the one side, and of unmixed utility on the other, she has been far less fortunate in that intermediate region where art is brought into contact with industry, and where the pair may wed together. This is a region alike vast and diversified. Upwards it embraces architecture, an art which while it affords the noblest scope of grace and grandeur, is, or rather ought to be, strictly tied down to the purposes of convenience. Downwards it extends to a very large proportion of the products of human industry; but while all the objects of trade and manufacture admit of fundamental differences in point of fitness and unfitness, probably the major part of them admit the fundamental differences also in point of beauty or ugliness. Utility is not to be sacrificed for beauty, but they are generally compatible, and often positively helpful to each other; and it may be safely asserted that the periods when the study of beauty has been neglected have

usually been marked, not by a more successful pursuit of utility, but by a general decline in the energies of man. In Greece the season of her highest historic splendour was also the summer of her classic poetry and art; and in contemplating her architecture, we scarcely know whether most to admire the acme of beauty, or the perfect obedience to the laws of mechanic contrivance. The arts of Italy were the offspring of her freedom—and with its death they languished and decayed. In the particular department of industrial art, France, perhaps of all modern nations, has achieved the greatest distinction, and there is no country which has displayed through a long course of ages a more varied activity or acquired a greater number of titles to renown. It would be easy to show that the reputation which England has long enjoyed with the trading world was for cheap and not beautiful productions. In some great branches of manufacture we were until late dependent upon patterns from abroad. In others our work presented nothing but a dreary waste of capricious ugliness. Some of us remember with what avidity thirty or forty years back the ladies of England smuggled every article of dress and ornament from France. That practice having now ceased, partly perhaps because there are no longer any duties to evade, but also because the preference has in some degree become modified because of the great progress made in the taste which this country applies to industry, I have understood that for some of the textile fabrics patterns are not imported only, but also exported and exchanged. Let us treat this as a matter of blame to our forefathers and commendation to ourselves. It has not been sufficiently considered what immense disadvantages are brought on the country, as respects the application of fine art to industry, by the great revolutionary war. Not only was the engrossing character of a deadly struggle unfavourable to all such purposes, but our communion with the civilised world was placed under restraint, and we were in great measure excluded from a resort to those cities and countries which possess in the greatest abundance examples bequeathed by former excellence. Nor could it be expected that kings and governments absorbed in a conflict of life and death, and dependent for the means of sustaining it on enormous and constant loans, would spare either thought or money from war and its imperious demands for these, the most pacific among all the purposes of peace. At any rate, I take it to be nearly certain that the period of a war was a period of general and progressive depression, and even degradation in almost every branch of individual art. The fabrics of your own manufacture, for example, were in point of beauty inferior to what they had been at a former time; others, such as those of Worcester, for instance, declined, and whereas Wedgwood is said to have exported five-sixths of what he made, we had not only lost any hold such as he had gained upon the foreign market, but we owed the loss in part at least to our marked decline in excellence and taste. I submit, however, that considering all that England has done in the sphere of pure beauty on the one side, and in the sphere of cheap and useful manufactures on the other, it is not only needless but would be irrational to suppose that she lies under any radical or incurable incapacity for excelling also in that intermediate sphere where the two join hands, and where Wedgwood gained the distinctions which have made him, in the language of Mr. Smiles, "the illustrious Wedgwood." I do not think that Wedgwood should be regarded as a strange phenomenon, no more native to us and ours than a meteoric stone from heaven —a happy accident without example and without return. Rare, indeed, is the appearance of such men in the history of industry; single perhaps it may have been among ourselves; for whatever the merit of others, such in particular as Mr. Minton, yet I for one should scruple to place any of them in the same class with Wedgwood—no one is like him, no one, it may almost be said, is even second to him; but the line on which he moved is a line on which everyone engaged in manufacture of whatever branch may move after him, and like him. And as it is the wisdom of man universally to watch against his besetting errors, and to strengthen himself in his weakest point, so it is the study and following of Wedgwood and Wedgwood's principles which may be confidently recommended to our producers as the specific cure for the specific weakness of English industry. Of imagination, fancy, taste, of the higher cultivation in all its forms, this great nation has abundance. Of industry, skill, perseverance, mechanical contrivance, it has yet a larger stock, which overflows our narrow bounds and floods the world. The one great want is to bring these two groups of qualities harmoniously together, and this was the peculiar excellence of Wedgwood; his excellence was peculiar in such a degree as to gain his name a place over every other, so far as I know, in the history of British industry, and remarkable and entitled to fame even in the history of the industry of the world. We make our first introduction to Wedgwood about the year 1741, as the youngest of a family of thirteen children, and as put to earn his bread at eleven years of age at the trade of his father, and in the branch of a "thrower." Then comes the well-known attack of small-pox, the setting of the disease in the lower part of the leg, and the amputation of the limb, rendering him lame for life. It is not often that we have such palpable occasion to record our obligations to the small-pox, but in the wonderful ways of Providence that disease, which came to him as a two-fold scourge, was probably the occasion of his subsequent excellence. It prevented him from growing up to be the active, vigorous English workman, possessed of all his limbs, and knowing right well the use of them; it put him upon considering whether, as he could not be that, he might not be something else, and something greater. It sent his mind inwards, and drove him to meditate upon the laws and secrets of his art: the result was that he arrived at the perception and the grasp of them, which might perhaps have been envied, and certainly had been owned, by an Athenian potter. Relentless criticism has torn to pieces the old legend of King Numa receiving in a cavern from the nymph Egeria the laws that were to govern Rome; but no criticism can shake the record of that illness and mutilation of the boy Josiah Wedgwood, which made for him a cavern of his bedroom and an oracle of his own inquiring, searching, inventive and fruitful mind. From those early days of suffering—weary perhaps to him as they went by, but bright surely in the retrospect lost to him and to us—a mark seems at once to have been set upon his career. But those who dwell upon his history have to deplore that many of the materials are wanting. It is not creditable to his country or his art that the life of Wedgwood should still remain unwritten. Here is a man, who in the well-chosen words of his epitaph, "converted a rude and inconsiderable manufacture into an elegant art, into an important branch of national commerce." Here is a man who beginning as it were from zero had, unaided by the royal or national gifts which were found necessary to uphold the glories of Sèvres, Chelsea, and of Dresden, produced works truer perhaps to the inexorable laws of art than the fine fabrics that proceeded from those establishments, and scarcely less attractive to the public taste. Here is a man who found his business cooped up within a narrow valley by the want of even tolerable communications, and who, while he devoted his mind to lifting that business from meanness, and ugliness, and weakness to the highest excellence of material and form, had surplus energy to take a leading part in great engineering works like the Grand Trunk Canal, from the Mersey to the Trent, which made the raw material of his industry abundant and cheap, which supplied a vent for the manufactured article, and opened for it materially a way to the outer world. Lastly, here is a man who found his country dependent upon others for its supplies of all the finer earthenware, but who by his single strength reversed the inclination of the scale and scattered his productions all over the breadth of the continent of Europe. And here I would say that

since I came to this room I have received a letter in which occurs the following quotation from the "Travels in England" of a French gentleman, M. E. Saint Fond. He says, referring to Wedgwood, "His excellent workmanship, its solidity, the advantage which it possesses of standing the action of fire, its fine glaze, impenetrable to acids, the beauty and variety of its form, and its moderate price, have created a commerce so active and so universal that in the dwellings from Paris to St. Petersburg, from Amsterdam to the farthest point of Sweden, from Dunkerque to the utter extremity of France, one is served at every inn from English earthenware. The same fine article adorns the tables of Spain, Portugal, and Italy; it provides the cargoes of ships for the East Indies, the West Indies, and America." It is strange that the life of such a man in this "nation of shopkeepers," as we are called, should at this date remain unwritten; but I have heard with much pleasure a rumour, which I hope is true, that such a gap in our literature is about to be filled up. All that we know, however of the life of Wedgwood seems to be eminently characteristic. We find the works of his earliest youth already impressing a new character upon his trade —a character of what may be called efficiency, combined with taste, and with the best basis of taste—a loving and docile following of nature. We find him beginning his partnerships when manhood was but just attained, first with Harrison, secondly with Whieldon, but as we might naturally expect in the case of a spirit so energetic and expansive, we find that in each of these cases the bed did not give him room enough to lie on or to turn in; and in 1759, as soon as his articles expire, he escapes from the unequal yoking, and enters into business by himself. But this, though a natural, was not a final stage. It was necessary that he who was the soul should also be the centre and head; but it was also necessary that he should surround himself at all points with an efficient staff, for a great, varied, and not merely reforming, but creative work. Hence he associated himself with Mr. Richard Bentley as a partner, who is stated to have chiefly superintended the London business, but who has credit for having supplied the information necessary to enable the firm to enter so largely on the handling of classical designs. Hence he employed Mr. Chisholm as an experimental chemist, and other scientific men in the several branches of the business. Hence his connexion with Flaxman, which has redounded alike to the honour of the one and of the other. It was once the fashion to say that Queen Elizabeth was not proved to be a woman of extraordinary power, but that she administered with vast ability; and in like manner some might be tempted to suspect, when they see Wedgwood thus surrounded, that his merit lay chiefly in the choice of instruments and coadjutors, and that to them the main part of the praise is due. What were the respective shares of Bentley and others in the great work of Wedgwood is a question of interest on which it may be hoped that we shall soon be more largely informed. It is plain that in an enterprise so extended and diversified there not only may, but must have been, besides the head, many assistants of merit sufficient to claim separate commemoration. As to the part which belongs to Flaxman, there is little difficulty; notwithstanding the distorting influence of fire, the works of that incomparable designer still in great part speak for themselves. To imitate Homer, Æschylus, or Dante, is scarcely a more arduous task than to imitate the artist by whom they were illustrated. Yet I, for one, cannot accept the doctrine of those who would have us ascribe to Flaxman the whole merit of the character of Wedgwood's productions, considered as works of art, and this for various reasons. First, from what we already learn of his earliest efforts, of the labours of his own hands, which evidence an elevated aim and a force bearing upwards mere handicraft into the regions of true plastic art, and again from that remarkable incident recorded in the history of the borough where he himself threw the first specimens of the black Etruscan vase, while Bentley turned the lathe. Secondly, because the very same spirit which presided in the production of the Portland or Barberini vase, or of the finest purely ornamental *plaques*, presided also in the production not only of *déjeûners* and other articles of luxury intended for the rich, but even of the cheap and common wares of the firm. The forms of the development were varied, but the whole circle of the manufacture was pervaded by a principle—one and the same. Thirdly, because it is plain that Wedgwood was not only an active, careful, clear-headed, liberal-minded, enterprising man of business—not only, that is to say, a great manufacturer, but a great man. He had in him that turn and fashion of true genius which we may frequently recognise in our engineers, but which the immediate heads of industry—whether in agriculture, manufactures, or commerce—have more rarely exhibited. It would be quite unnecessary to dwell on the excellencies of such of the works of Wedgwood as belong to the region of fine art strictly so-called, and are not classed as commodities for use. To them all the world does justice. Suffice it to say, in general terms, that they may be considered partly as imitations and partly as reproductions of Greek art. As imitations they carry us back to the purest source. As reproductions they are not limited to the province of their originals, but are conceived in the genial and free spirit of that with which they have relationship. But it is not in happy imitation, it is not in the successful presentation of works of fine art that, as I conceive, the speciality of Wedgwood really lies. It is in the resuscitation of a principle—the principle of Greek art; it is in the conception and grasp of the unity and comprehensiveness of that principle. That principle, I submit, lies after all in a severe and perfect propriety in the uncompromising adaptation of every material object to its proper end. If that proper end be the preservation of beauty alone, then the production of beauty is alone regarded, and none but the highest models of it are accepted. If the proper end is the production of a commodity for use, and perishable, then a plural aim is before the designer and producer. The object must first and foremost be adapted to its use as closely as possible. It must be of material as durable as may be; it must be of the most moderate cost; then it must receive all the beauty which can be made conducive to or concordant with the use; and because this business of harmonising use and beauty—so easy in the works of nature —is arduous to the faculty of man, it must be made the object of special and persevering care. To these principles the works of Wedgwood habitually conformed. He did not in the pursuit of beauty overlook exchangeable value or practical usefulness. The first he could not overlook, for he had to live by his works, and it was from the profit derived from the constant sale of his humbler productions that he was enabled to bear the risks and charges of his higher works. Commerce did for him what the Kings of France did for Sèvres, and the Duke of Cumberland for Chelsea, viz., provided him with funds. And I would venture to say that the lower works of Wedgwood are as much distinguished by the fineness and accuracy of the adaptation to their uses as his higher ones by the successful exhibition of the finest art. Take, for instance, his common plates, of the value of a few pence each. They fit one another closely, as the cards in a pack. At least, I for one have never seen any plates that fit like those of Wedgwood, and become one solid mass. This accuracy of form must, I apprehend, render them much more safe in carriage. Of the excellence of these plates, we may take it for a proof that they were largely exported to France, if not elsewhere; that they were then printed or painted with buildings or scenes belonging to that country, and then sent out again as national manufactures. Again, take such a jug as he would have manufactured for the garret washhand table. I have seen these made apparently of the commonest material used in the trade, but instead of being built up like many more fashionable jugs of modern manufacture, in such a manner that a crane could not get his neck to bend into them, and that the water

cannot be poured out of them without risk of spraining of the wrist, they are constructed in a simple, capacious form of flowing curves, broad at the top, and so poised that a slight movement of the hand discharges the water. A round cheese-holder or dish generally presents in its upper part a flat space surrounded by a curved rim; but a cheese-holder of Wedgwood's will make itself known by this, that the flat is so dead a flat, and its curve so marked and bold a curve, as at once to furnish the eye with a line agreeable and well defined, and affording the utmost available space for the cheese. I feel persuaded that a Wiltshire cheese, if it could speak, would declare itself infinitely more comfortable in a dish of Wedgwood's than in any other dish. Again, there are certain circular inkstands by Wedgwood, which are thus described in the 21st section of the catalogue. Great care has been bestowed upon the mechanical arrangement with a view to the preservation of the pen and the economical and cleanly use of the ink. The prices are from sixpence to eight shillings, according to size and finish. I have one of them, not, however, black like those mentioned in the catalogue, but of his creamy white ware. I guess it must have been published at the price of a shilling or less. It carries a slightly rectilinear ornament, which agreeably relieves a form otherwise somewhat monotonous. It is so tasteful that it would not disgrace a cabinet, so plain that it would suit a counting-house. It has no pretension. All Wedgwood's works, from the lowest upwards, abhor pretension. Wedgwood always seems to have in view a standard of excellence indefinitely high. He never falls into extravagance or excess. I do not mean to say that all the works produced from his furnaces are equally satisfactory, but I am confident that it is easy, even from his cheapest and lower productions, to prove him to have been a man of real genius, thoroughly penetrated with the best principles of art. I have spoken of Wedgwood's cheapest, and also of his costliest productions; let me now say a word on those which were intermediate. Of these some appear to me to be absolutely faultless in their kind, and to exhibit, as happ ly as the remains of the best Greek art, both the mode and the degree in which beauty and convenience may be made to combine in manufacture. I have a slate coloured *déjeûner* of the ware which I believe is called Jasper ware. T is seems to me a perfect model. The tray is a short oval, excessively light, with a surface soft as the finest flesh to the touch, having for ornament a mere scroll of white riband, very graceful in its folds, and shaded with partial transparency. The upper pieces have a ribbed surface, and a similar scroll re-appears, while for their principal ornament they are dotted with white quatrefoils. These quatrefoils are delicately adjusted in size to the varying circumferences, are executed with a rare feeling of nature, and with a precision that would scarcely do discredit to a jeweller. Enough, however, of observations on particular specimens of your great master's work. But let me hazard a few words yet on the general qualities of his business and his productions. It seems plain that though not educated in youth for any purpose of art, he contrived to educate himself to it amid the busy scenes of life. His treatise on the pyrometer shows that he had studied, or at any rate had acquired the science applicable to his art. His account of the Barberini vase proves that he had qualified himself to deal with the subjects of classical antiquity. But nothing can be more characteristic of his mind than the firmness with which, at the close of his catalogue, the intentions of the firm respecting cheap productions are declared. He has explained, as I have already mentioned, that the utmost cheapness can hardly be had along with the highest beauty. He goes on to indicate his prices as compared with those of others, and concludes his apology in terms which do the firm the highest honour, by declaring plainly "they are determine to give over manufacturing any article, whatsoever it may be, rather than to degrade it." A clear proof, I think, that something which resembles heroism has its place in trade. With this bold announcement to the world was combined, within the walls of his factory, the unsparing sacrifice of defective articles, which down to this day supplies the collector in many cases with the test he needs in order to ascertain the genuine work of Wedgwood. The lightness of Wedgwood's ware, which is an element not merely of elegance but of safety, the hardness and durability of the substances, the extraordinary smoothness and softness to the touch of the surfaces, their power of resisting heat and acids, the immense breadth of the field he covered, with the number and variety of his works in point of form, subject, size, and colour—this last, particularly as to his vases—his title almost to the paternity to the art of relief in modern earthenware; all these are characteristics which I am satisfied only to name. There are, however, two other points still on my mind—one the general character of his colours, the other his extraordinary merit as a restorer of forms in fictile products. The general character of his colour may perhaps be justly described as a strict sobriety imbibed from and closely following the antique. He did not attempt to cover the entire field of porcelain manufacture. That which is perhaps the noblest and most arduous part of all its work, modelling the human form in the solid, he rarely, if, indeed, he ever, attempted; and we must not look to him for the gay diversity of its colouring and subjects, or for the particular splendid effects yielded by its deep blue grounds. In no instance known to me does he indulge in showy colours. He has highly glazed vases in admirable taste, but usually, I think the ground is some variety of green or grey. He could not, however, have been insensible to the attractions of such colouring as was produced at Sèvres or at Chelsea. Where we find a general characteristic running through the works of a man like Wedgwood we may safely assume that there was a reason for it. Probably or possibly the reason for the restraint and sobriety of the colours of Wedgwood is to be found not in mere imitation, but in the classical severity of his forms. I hope it will not be thought presumptuous to give utterance to an opinion that the forms of many among the most costly and splendid vases which were produced at Chelsea and even at Sèvres in the last century were unsatisfactory; sometimes fantastic, often heavy and ungainly, rarely successful in harmonising the handles with the vessel, and upon the whole neither conformable to any strict law of art, nor worthy of the material. the fine colouring, drawing, composition, and gilding, there and elsewhere so often exhibited in the decoration. On comparing the forms of the vases with Wedgwood's, although these latter have doubtless suffered, as to their finest proportions, from shrinking in the fire, I think it is impossible to avoid feeling struck with his superiority, and feeling that his lifetime constitutes in fictile manufacture nothing less than a new era as to form. It is hard to avoid conjecturing that his eye must have noticed, and must in this respect have condemned, the prevailing fashion, and that he must have formed a deliberate resolution to do that which I think unquestionably he did, namely to exhibit to the world in this vital particular a much higher standard of excellence. Of the personal character of Wedgwood in its inner sense, the world has not yet been informed; but I can never presume otherwise than well of one who, in all those aspects which offer themselves to the view of the world, appears to have been admirable. For our present purpose, let us consider him only as a master, which is a matter of more than common interest at a time when so many of the most eminent firms in the district have in a manner the most laudable themselves called the attention of public authority to the condition of their younger labourers, with a view of obtaining the friendly aid of legislative interference for their instruction and protection. Indeed, we may say of the all-important question of the people what we said of the condition of the beauty in manufacture. The demand for cheapness presses hard upon it, yet nothing which depresses the moral or physical condition of the people below the standards of sufficiency and of health

can in the end be cheap. In the year 1769, when Wedgwood was promoting the Grand Trunk Canal, and building his works, and settling his colony at Etruria, Goldsmith published the beautiful poem of "The Deserted Village," which he chose with strange caprice to found upon the idle notion that it was the tendency of trade to depopulate the country. He says:—

> Ill fares the land, to hastening ills a prey,
> Where wealth accumulates and men decay.

Nor does he only mean that trades ill-regulated may be injurious to health. After describing rural happiness, he begins the lament—

> But times are altered, trade's unfeeling train
> Usurp the land and dispossess the swain.

What is most of all singular is, that he associates this substitution of towns for villages with decrease in the numbers of the people.

> If to the city sped, what waits him there?
> To see profusion that he must not share:
> To see ten thousand baneful arts combin'd
> To pamper luxury and thin mankind.

Now at any rate, Wedgwood's does not appear to have been one of those "baneful arts." Listen to the account given by Mr. Smiles of the way in which Wedgwood thinned mankind:—"From a half-savage, thinly populated district of some 7,000 persons, partially employed and ill-remunerated, we find them increased, in the course of some twenty-five years, to about treble in population, abundantly employed, prosperous, and comfortable." Nor was this multiplication only, without improvement, for he goes on to quote from John Wesley, who had been pelted at Burslem, in 1760, the following remarkable words: "I returned to Burslem. How is the whole face of the country changed in about twenty years, since which inhabitants have continually flowed in from every side; hence the wilderness is literally become a fruitful field. Houses, villages, towns, have sprung up, and the country is not more improved than the people." It is impossible to conceive a testimony more honourable to Wedgwood. Nor can I better conclude these remarks than by uttering the cordial hope that you, his successors, who have during late years earned so much honour for the taste and industry of the country, may profit more and more effectually by the lessons which your great forerunner has bequeathed you, and may find at least one substantial part of your reward in witnessing around you a thriving and contented, a healthy and a happy population.

In the evening a banquet took place in the Town Hall.

BRITISH ASSOCIATION, NEWCASTLE-UPON-TYNE, 1863.

ON THE MANUFACTURE OF ALUMINIUM. BY ISAAC LOWTHIAN BELL, MAYOR OF NEWCASTLE.

The progress of the manufacture of this—so far as the arts are concerned—new metal has scarcely been such as to require much to be added to those admirable researches bestowed upon the process by the distinguished chemist, M. St. Clare Deville, of Paris. Upon the introduction of its manufacture at Washington, three and a half years ago, the source of the alumina was the ordinary ammonia of commerce — a nearly pure sulphate of alumina and ammonia. Exposure to heat drove off the water, sulphuric acid, and ammonia, leaving the alumina behind. This was converted into the double chloride of aluminium and sodium by the process described by the French chemist and practised in France, and the double chloride was subsequently decomposed by fusion with sodium. Faint, however, as the traces might be of impurity in the alum itself, they to a great extent, if not entirely (being of a fixed character when exposed to heat) were to be found in the alumina. From the alumina, by the action of chlorine on a heated mixture consisting of this earth, common salt, and charcoal, these impurities, or a large proportion thereof, found their way into the sublimed double chloride, and, once there, it is unnecessary to say that, under the influence of the sodium in the process of reduction, any silica, iron, or phosphorus found their way into the aluminium sought to be obtained. Now, it happens that the presence of foreign matters, in a degree so small as almost to be infinitesimal, interferes so largely with the colour, as well as with the malleability of the aluminium, that the use of any substance containing them is of a fatal character. Nor is this all, for the nature of that compound which hitherto has constituted the most important application of this metal—aluminium-bronze—is so completely changed by using aluminium containing the impurities referred to that it ceases to possess any of those properties which render it valuable. As an example of the amount of interference exercised by very minute quantities of impurity, it is perhaps worthy of notice that very few varieties of copper have been found susceptible of being employed for the manufacture of aluminium-bronze; and hitherto we have not at Washington, nor have they in France, been able to establish in what the difference consists between copper fit for the production of aluminium-bronze and that which is utterly unsuitable for the purpose. These considerations have led us, both here and in France, to adopt the use of another raw material for the production of aluminium, which either does not contain the impurities referred to as so prejudicial, or contains them in such a form as to admit of their easy separation. This material is Bauxite, so called from the name of the locality where it is found in France. It contains—

Silica	2·8
Titanium	3·1
Sesquioxide of iron	25·5
Alumina	57·4
Carbonate of lime	0·4
Water	10·8
	100·0

The Bauxite is ground and mixed with the ordinary soda-ash of commerce, and then heated in a furnace. The soda combines with the alumina, and the aluminate of soda so formed is separated from the insoluble portions, viz., peroxide of iron, silico-aluminate of soda, &c., by lixiviation. Muriatic acid or carbonic acid is then added to the solution, which throws down pure alumina. The remainder of the process is precisely that which is described by Mons. St. Claire Deville. The alumina is mixed with common salt and charcoal, made into balls the size of an orange, and dried. These balls are placed in vertical earthern retorts, kept at a red heat, and through the heated contents chlorine gas is passed. The elements of the earth, under the joint influence of carbon and chlorine at that temperature, are separated—the carbon taking the oxygen, and the chlorine the aluminium. The latter substance, accompanied by chloride of sodium (common salt), sublimes over, and is collected, as a double chloride of aluminium and sodium. In small iron retorts, kept at as high a temperature as iron can bear, a mixture of soda (carbonate of soda), and carbonaceous matter, with a little ground chalk is placed. The metallic base of the alkali distils over and is collected in coal oil. A portion of the double chloride and sodium, along with fluxes, is exposed to a full red heat in a reverberatory furnace. The sodium seizes the chlorine combined with the aluminium, and thus liberates the latter metal, which falls to the bottom of the fused mass.

Aluminium is used in sufficient quantity to keep the only work in England, viz., that at Washington, pretty actively employed. As a substance for works of art, when whitened by means of hydrofluoric and phosphoric acid, it appears well adapted, as it runs into the most complicated patterns, and has the advantage of preserving its colour, from the absence of all tendency to unite with sulphur, or to become affected by sulphuretted hydrogen, as happens with silver.

A large amount of the increased activity in the manufacture referred to is due to the exceeding beauty of the compound with copper, already spoken of, which is so like gold as scarcely to be distinguishable from that metal, while it possesses the additional valuable property of being nearly as hard as iron.

This alloy, or aluminium bronze, as it is termed, is a discovery of Dr. John Percy, F.R.S., and appears to be a true chemical compound. Copper is melted in a plumbago crucible, and after being removed from the furnace, the solid aluminium is added. The union of the two metals is attended with such an increase of temperature, that the whole becomes white hot, and unless the crucible containing the mixture is of refractory material, a vessel which has resisted a heat sufficient to effect the fusion of copper melts when the aluminium is added.

Mr. Gordon, was the first, it is believed, who detected and determined the amount of tension wire of aluminium bronze was capable of resisting, which he found to be between that of the best iron and the best steel wire. Colonel Strange, of the Royal Astronomical Society, investigated its properties, which were given in a very able paper in the transactions of that body. Its malleability, ductility, and capability of being finely divided and engraved upon, along with its great strength, induced the Colonel to recommend its adoption in the theodolite used in the Trigonometrical Survey of India.

At the Elswick Ordnance Works, Captain Noble, R.A., confirmed previous experiments on the capability of aluminium bronze to resist longitudinal and transverse fracture, and in addition to this he ascertained that its position to withstand compression stood halfway between that of the finest steel and the best iron.

The bronze, containing ten parts of aluminium and ninety of copper, affords an alloy endowed with the greatest strength, malleability, and ductility. The colour of the copper is affected by a very trifling addition of the other constituent, and the alloy gradually improves in those valuable qualities just mentioned until the proportions given above are reached. After this, *i.e.* when more than ten per cent. of aluminium enters into the composition of the bronze, the alloy gradually becomes weaker and less malleable, and at length is so brittle that it is easily pounded in a mortar.

THE PROGRESS OF THE TEA TRADE.

By P. L. Simmonds.

Among the immense number of persons who deal in, and daily consume tea, there are probably fewer acquainted with the early history and enormous progress of consumption of this article of commerce than is the case with many other large articles of trade. The import and use of tea has already made and is yearly making such rapid strides, that it is difficult to keep pace with the figures, and a short *résumé*, brought down to the present time, may, therefore, not be without interest to many.

The benefits that have resulted from the general introduction of tea amongst the necessaries of life are inestimable. Besides adding an important article to the commerce of this country, it has become a most valuable auxiliary to the health, comfort, and happiness of all classes. The old cynic, Dr. Johnson, would cease his growling and make himself interesting over Mrs. Thrale's twelfth cup of tea. "It is poison," said some *bon vivant* to him. "Sir," he replied, "it may be poison, but I have been seventy years dying of it;" and he drained another bowl. The loquacious Coleridge would indulge in a monologue of an hour's length, holding his hearers spell-bound, on the virtues of tea, and write articles upon the most approved mode of decocting it. The quiet and gentle Elia, with his loved and loving sister, received solace and comfort after his toilsome labours at the India House by imbibing the refreshing and invigorating beverage.

For gentle, as well as simple, tea has its attractions. John Chinaman uses it habitually, as we do water, to quench his thirst, or as many do alcohol to excite, while the rich and fashionable with us regard it as an essential appendage to the breakfast table and social evening circle. The lonely shepherd in the Australian bush, the miner at the gold-fields, the ice-bound navigator in the Arctic regions, the day labourer after his toil, the washerwoman, all receive comfort from their use of tea, and the scholar has his mind strengthened, his wit sharpened, his nerves more firmly strung by the healthful potation. Tea is the great domestic panacea—soothing, cheering, comforting, stimulating, and invigorating all who partake of it.

This was not the general opinion entertained of tea on its early introduction. For, a writer in the *Grub-street Journal*, in 1737, says:—"If we compare the nature of tea with the nature of English diet, no one can think it a proper vegetable for us. Its essential salt does not hold moisture enough to be joined to the body of an animal; its oil is but very little, and that of the opiate kind, which irritates and frets the nerves. But were it entirely wholesome, as balsam or mint, it were yet mischief enough to have our whole population used to sip warm water in a mincing manner twice a day. Tea gives an effeminate turn to the people."

My object, however, is not to eulogise tea, but to enter into the more practical matter-of-fact details of supply and demand.

In 1766, the whole quantity of tea imported into Europe amounted to about 17,000,000 lbs.; in 1785, it was computed at 19,000,000 lbs. Last year the imports into this kingdom alone were 114,787,452 lbs., while the United States consume about 37,000,000 lbs., and the continent of Europe nearly a similar quantity.

In 1788, the consumption of tea in the United Kingdom was 14,764,565 lbs.; in 1800, 23,272,000 lbs.; in 1830, 30,046,935 lbs.; in 1860, 76,859,428 lbs.; and in 1862, 78,817,060 lbs.

Taking the population of the United Kingdom at 29,000,000, the average consumption of tea per head, last year, was about 2¾ lbs., a very considerable increase upon former periods, as the following data will show:—

	lbs. consumed.	Average.	Duty.
1831	29,997,101	1 lb. 4 oz.	96 per cent.
1841	36,675,667	1 lb. 6 oz.	2s. 1d. per lb.
1851	53,965,112	1 lb. 13 oz.	2s. 2¼d. ,,
1862	78,817,060	2 lb. 12 oz.	1s. 5d. ,,

The total duty received on tea in the last four years has varied but little, approximating very closely to £5,500,000. Indeed, last year's consumption brought in as much to the Exchequer, under the 1s. 5d. duty, as the 2s. 2d. duty did in 1850, arising out of the large increase of tea consumed between the two periods, from 50,000,000 lbs. to 79,000,000 lbs.

This enormous increase must have taken some statists by surprise. Mr. Montgomery Martin, when Treasurer of Hong Kong, drew up and transmitted to the Home Government, in July, 1845, an official report, in which occur the following passages:—

"It is more than probable that tea has now reached the limit of production in England [it was then 44,000,000 lbs.], and that any reduction of duty would not augment the use of this innutritious leaf."

"Tea," he adds, "is neither a nutriment nor a necessary of life. Its use does not improve the physical stamina of the people; in fact, it acts the very reverse by its injurious effects on the nervous system, unless when accompanied by a full diet of animal food and fermented liquors. Again, the position, soil, and climate adapted for the growth of tea in China is limited, and no large quantity of drinkable tea could be suddenly obtained in China; any reduction of duty would, therefore, not lessen the price of tea to the consumer."

The statistics already given show that tea has not even

yet reached the limit of consumption, although nearly 35,000,000 lbs. more are used now than in 1845, and that reduction of duty, while it has enormously increased imports, has not enhanced prices, nor exhausted the producing capabilities of China, whilst Japan and India have gone extensively into the cultivation and manufacture.

Considering the enormous labour of manufacturing tea, it is surprising that even the poorest kind can be afforded to the foreign purchaser at the Chinese ports at the low price at which it is obtained. In their ability to furnish it at this rate, the Chinese have a security for retaining the trade in their hands, notwithstanding the efforts making to grow the plant in India and elsewhere. The vast extent of the Chinese Empire, the cheapness of labour there, and its capabilities of raising unlimited quantities of tea, negative the idea that any fear need exist of ever exhausting this supply. Although consumption, since the commencement of the century, has so enormously increased in the United Kingdom, the prices in all markets have declined.

EDUCATION OF THE DEAF AND DUMB.

The number of schools for the deaf and dumb has been rapidly increasing during the current century. At the beginning of the century there were hardly a dozen such schools. Thirty years ago the number of European institutions for the deaf and dumb was about 118, containing, at most, 3,300 pupils. Ten years ago the number of institutions was estimated at 180, and the number of pupils at 6,000. Of the European institutions there are about 80, mostly small ones, in Germany, 45 in France, and 22 in the British Isles. There are also two or three schools in British America. The three largest European schools are those of London, with about 300 pupils, Paris with about 170, and Groningen, in Holland, with about 150.

The number of American institutions has also steadily increased. The American Asylum at Hartford is the oldest, having been opened in 1817. The New York institution is next in age, dating from 1817, and the Pennsylvania institution was opened in 1820. The Kentucky institution was opened in 1823, that of Ohio in 1829, and that of Virginia in 1839. The progress of the cause may be seen by the annexed table:—

Date.	No. of Institutions.	No. of Teachers.	No. of Pupils.
1834	6	34	466
1851	13	75	1,162
1857	20	118	1,760
1860	22	130	2,000

The New York institution is the largest in the country, and probably in the world, having 310 pupils. The asylum at Hartford has about 225, the institution at Philadelphia 206, and the schools of Ohio, Indiana, and Illinois from 140 to 170. The southern institutions are comparatively small, but their present condition cannot be ascertained. Of the 130 teachers, including the principals, about half are men of liberal education, about 15 are females, and about 50 are educated deaf-mutes.

The support of these twenty-two institutions costs not far from 350,000 dollars annually, of which as much as 300,000 dollars is appropriated by the legislatures of twenty-nine States. Provision for the education of the deaf and dumb, in some cases restricted to the indigent, in others made free to all, is made by law in all the States, except the sparsely settled ones of Florida, Arkansas, Minnesota, Kansas, and Oregon. All the New England States send their beneficiaries to Hartford, New Jersey sends hers to New York and Philadelphia, and Maryland and Delaware send theirs to Philadelphia, or to the institution at Washington, under the patronage of the President and Congress.

In the buildings and grounds of these several institutions, up to the date of the last information, over a million and a-half of dollars had been invested. Except the necessary buildings and appurtenances, the institutions generally possess no permanent funds, being dependent on annual appropriations from the states, but there are three or four exceptions. The only considerable permanent fund is that of the American Asylum, derived from a grant of a township of land, made by Congress, through the generous aid of Henry Clay, as early as 1819. This fund now amounts to 200,000 dollars. The Texas institution has been munificently endowed by the legislature of that State with a grant of 100,000 acres of land.

In estimating the cost of instructing the deaf and dumb of the United States, it must be remembered that seven of the twenty-two institutions, those of Virginia, North Carolina, South Carolina, Louisiana, Michigan, California, and the Columbian Institution in Washington, are also institutions for the blind as well as for the deaf and dumb, and that the support of their 136 blind pupils is included in the sum already given as the total annual expense of the twenty-two institutions. Allowing for these, the actual expense of educating the 2,000 deaf-mutes now in school may be estimated at 330,000 dollars. The number now under instruction ought to be considerably larger, especially in the southern States, to give all the deaf and dumb that education which alone can raise them to the rank of intelligent and useful citizens. It is restricted less from the difficulty of obtaining appropriations from the State legislatures than from the apathy of unenlightened parents, and their unwillingness to part with their children.

ARTIFICIAL FERTILISATION OF CROPS.

A singular discovery has lately been announced in France. The discovery however is that of a Dutchman, M. Hooibrenk, and the results of his researches have been so well marked and valuable that he has been awarded the Cross of the Legion of Honour by the Emperor, who has directed that a scientific commission be appointed to investigate and report upon the matter. M. Hooibrenk supposes that the number of grains in an ear of corn can be increased by bringing a larger quantity of pollen into contact with the stigmate than they usually receive. He conducts his experiments as follows:—He takes a cord of from twenty-five to thirty yards long, and fastens to it a stiff woollen fringe of about ten inches long; he steeps it for a short time in honey, and drags it over the fields of corn two or three times after flowering. It catches the pollen from the anthers and applies it to the stigmata (it is, in fact, Mr. Darwin's bee-process on a gigantic scale), and the result is a greatly increased crop. This method has been tried in conjunction with the old one, on a farm near Epernay, in Champagne, the property of the celebrated wine dealers, Messrs. Jaquesson. The results beneath show the relative advantages of both systems:—

	Hooibrenk's System. Kilogrammes.	Old System. Killogrammes.
Wheat	31	21
Rye	25·5	16
Barley	24	16
Oats	17	12

It has been conjectured that the results would have been still more striking had not this season been such a favourable one. Fruit and garden vegetables have been similarly treated, and with a like success. It has been found also that an inclination of 112° of the branches of the vine produces some effect upon the flow of the sap, and increases the fruit crop. M. Hooibrenk maintains that by his process, and without any material additional outlay, crops of fruit, vegetables, and corn can be increased in value 50 per cent.

MEETINGS FOR THE ENSUING WEEK.

Mon. .. Medical, 8½. Mr. De Méric, "Occasional Non-transmission of Syphilis to the Offspring."
Royal Inst. 2. General Monthly Meeting.

Tues. ...Anthropological, 8. 1. Mr. C. Carter Blake, F.G.S., "On the Anthropological Papers read at the British Association." 2. Professor John Marshall, F.R.S., "On Microcephalic Brains." 3. Mr. G. E. Roberts and Professor Busk, F.R.S., "On the opening of a Cist at Burghead." 4. Capt. E. W. Jacob, "On the Indian Tribes of Vancouver's Island."
Geologists' Association, 7. Mr. Carter Blake, F.G.S., "On Fossil Elephants."

Wed. ...Geological, 8. 1. Sir P. de M. G. Egerton, F.R.S., F.G.S., "On some Ichthyolites from New South Wales." 2. Mr. A. Leith Adams, A.M., "Notes on the Geology of a portion of the Nile Valley." (Communicated by L. Horner, Esq., F.R.S., V.P.G.S.)

Thur....Chemical, 8. 1. Dr. Sprengel, "Detection of Nitric Acid." 2. Dr. Thudichum, "Physiological variations of hippuric acid in human urine."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, October* 23*rd*, 1863.]

Dated 15*th June*, 1863.

1491. W. W. Box, Birmingham—Imp. in fire-bars for the boilers of locomotive and other engines, and for fire-boxes and furnaces generally.

Dated 11*th July*, 1863.

1739. H. Greaves, Abingdon-street, Westminster—Imp. in the construction of railways and tramways.

Dated 11*th September*, 1863.

2241. L. Meyer, 36, Rue de Marseille, Paris—Improved means of and apparatus for employing vapours, gases, and the heat derived from combustible matters.

Dated 18*th September*, 1863.

2300. H. C. Huskinson, Manchester—Imp. in the manufacture of buttons.

Dated 26*th September*, 1863.

2373. L. H. Norris, 6, Upper Bedford place, Russell square—Imp. in the manufacture of india rubber and gutta percha compounds. (A com.)

Dated 6*th October*, 1863.

2443. W. Holgate, H. Holgate, and T. Holgate, Accrington, Lancashire—Imp. in the manufacture of pickers used in weaving.

Dated 7*th October*, 1863.

2449. D. Barr, Birmingham—Imp. in apparatus for regulating and working window blinds.

Dated 8*th October*, 1863.

2463. A. P. Charpentier, Palais Royal, Paris—Imp. in the manufacture of watches.
2467. W. Lorberg, 4, Wild's-rents, Bermondsey—Imp. in the manufacture of gas from tar.
2469. R. G. Watson and W. J. Kendall, Preston, Lancashire—An improved walking-stick umbrella.
2471. J. Spencer, Doncaster—Imp. in machinery for separating different sizes of roots.

Dated 9*th October*, 1863.

2477. G. Parry, Ebbw Vale Iron Works, Monmouthshire—Imp. in refining crude pig iron and in furnaces connected therewith.
2479. J. Mather, Crow Oaks, near Radcliffe, Lancashire—Imp. in friction or glazing calenders.

Dated 10*th October*, 1863.

2485. J. Vaughan, Middlesborough, Yorkshire—Improved apparatus for purifying waste gases from blast and other furnaces.
2487. J. Ruthardt and F. Thiele, Oxford-market, Oxford-street—Imp. in apparatus for purifying and increasing the illuminating power of gas.
2491. T. Hughes, Wolverhampton—Imp. in the manufacture of lanthorns.

Dated 12*th October*, 1863.

2493. P. R. Jackson, Salford—Imp. in the manufacture of hoops and tyres for railway wheels and other purposes, and in the machinery employed therein.
2495. J. G. Hartley, 11, Laurence Pountney-lane—Imp. in the construction of iron and wooden ships and other vessels.
2497. W. T. Bury, Regent Works, Sheffield—An imp. in vessels or baths for containing heated metals and fluxes employed in the processes of hardening and tempering steel and steel articles.
2499. T. Gidlow, Heaton, Lancashire—Certain imp. in bearings for axles for railway or other carriages.
2501. W. E. Gedge, 11, Wellington-street, Strand—Imp. in shears for cutting metals and other substances. (A com.)
2503. R. Aitken, Cambridge-street, Pimlico—Imp. in the permanent way of railways.
2505. J. J. Anderton, Saint James's-street, Northampton—Imp. in machinery for cutting and finishing the edges of the soles and heels and the bottoms of boots and shoes.

Dated 13*th October*, 1863.

2507. G. Morgan, 3, Budge-row—An improved "sample" bag for postal and other purposes.
2511. T. C. Craven, Greenbush, U.S.—Imp. in cotton gins.
2513. J. Fowler, Leeds—Imp. in apparatus used for hauling agricultural implements.

Dated 14*th October*, 1863.

2515. J. Rowley, Leeds—Imp. in apparatus for washing, scrubbing, scouring, bleaching, and discharging impurities or other matters from woven or other fibrous materials.
2517. E. P. Colquhoun and J. P. Ferris, 1, Lawrence Pountney-hill—Imp. in fire-bars for the furnaces of steam boilers, and the mode of mounting the same.
2519. J. Milton, Paisley—Imp. in looms for weaving.
2521. O. E. Sonnenstein, Minories—Imp. in reflecting apparatus. (A com.)

Inventions with Complete Specifications Filed.

2522. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—An improved apparatus for cleaning ships' hulls. (A com.)—14th October, 1863.
2546. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in washing machines. (A com.)—17th October, 1863.

Patents Sealed.

[*From Gazette, October* 23*rd*, 1863.]

23rd October.

1022. J. Cornes and J. C. Davis.
1033. J. P. Nunn & E. B. Nunn.
1050. M. Valkenhuysen.
1056. W. Hudson and C. Catlow.
1061. S. Crabtree.
1062. G. Hall and J. Wells.
1063. A. Kinder.
1069. T. Moore.
1077. W. Tarr and E. Farr.
1079. E. Leigh and F. A. Leigh.
1082. M. Barland and E. H. C. Monckton.
1087. J. Wibberley.
1022. C. P. Stewart and J. Kershaw.
1093. J. Appleby.
1097. W. Clissold.
1098. W. G. Craig.
1104. J. Purdey.
1107. J. T. Oakley & T. Oakley.
1133. G. Davies.
1172. J. Burrell.
1174. J. Burrell.
1200. H. Wilde.
1367. L. S. Chichester.
1758. J. Holmes, G. T. Holmes, and F. R. Holmes.
1782. H. Elliott.
1791. N. Thompson.
1962. J. Thornton, J. Thornton, A. Thornton, and W. Thornton.
2072. W. E. Newton.
2226. A. V. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, October* 27*th*, 1863.]

19th October.

2605. H. Cook.
2634. W. E. Newton.

20th October.

2566. E. W. Hughes.
2643. T. Greenwood and J. Dockray.

21st October.

2584. C. Lundley.
2527. J. Chisholm, G. Chisholm, and R. T. Kent.

22nd October.

2582. R. Baynes.
2688. W. Clark.

23rd October.

2578. W. H. Tylor.
2610. W. Sharpe.

24th October.

2612. T. Cobley.
2618. W. Syrett.
2677. J. Bettyes.

Patents on which the Stamp Duty of £100 has been paid.

[*From Gazette, October* 27*th*, 1863.]

19th October.

2530. J. Armstrong.

20th October.

2545. P. Fairbairn & R. Newton.

21st October.

2480. G. Erman.
2576. S. Tearne and G. W. Richmond.

LIST OF DESIGNS OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4586	Oct. 15.	Blast Cylinder	Richald Howson; Edwin Francis Jones	Middlesborough.
4587	,, 17.	Improved Feeding Trough	Jas. F. M. Hawkins	Northall, Dunstable.
4588	,, 19.	Invalid's Bed Bath	Jas. E. Maddox	19, University-street, Bedford-square.
4589	,, 24.	Counter Box for Coffee and other materials.	Pryce Hughes	14, London-street, Paddington.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 6, 1863.

NOTICE TO MEMBERS.

The One-Hundred-and-Tenth Session of the Society will commence on Wednesday, the 18th November, at 8 o'clock, when WILLIAM HAWES, Esq., F.G.S., Chairman of the Council, will deliver the Opening Address. The Chair will be taken at eight o'clock on the following Wednesday evenings:—

1863. November	—	—	18	25		
,, December	2	9	16	—	—	
1864. January	—	—	20	27		
,, February............	3	10	17	24		
,, March...............	2	9	16	—	30	
,, April	6	13	20	27		
,, May..................	4	11	18	25		
,, June	—	—	—	29*		

For the Meetings previous to Christmas the following arrangements have been made:—

NOVEMBER 18.—Opening Address by WILLIAM HAWES, ESQ., F.G.S., Chairman of the Council.

, *On this evening the Prince Consort's Prize, awarded at the last Examination, and the Prizes awarded to the Artist-workmen who were successful competitors at the Wood-carving Exhibition held in June last, will be distributed.*

NOVEMBER 25.—" The Australian Colonies, their Condition, Resources, and Prospects." By Sir CHARLES NICHOLSON, Bart.

DECEMBER 2.—" On Magneto-Electricity, and its Application to Lighthouse Purposes." By F. H. HOLMES, ESQ.

DECEMBER 9.—" Recent Agricultural Progress and its Causes." By J. CHALMERS MORTON, ESQ.

DECEMBER 16.—" On the Economic Value of Foods, having special reference to the Dietary of the Labouring Classes." By Dr. EDWARD SMITH, F.R.S.

The Council have made arrangements for the delivery of Courses of Lectures on the following subjects during the ensuing Session:—

Fine Arts Applied to Industry. By W. BURGESS, Esq.
Chemistry Applied to the Arts. By Dr. F. CRACE CALVERT, F.R.S.
International Commerce. By G. W. HASTINGS, Esq., Barrister-at-Law.

These Lectures will be open to Members and their Friends on the same conditions as the Ordinary Meetings. Particulars of the Courses will be duly announced.

COUNCIL.

The following Institution has been received into Union since the last announcement:—

Llanelly Mechanics' Institution.

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

PREVENTION OF DECAY AND OXIDATION IN SHIPS.

As the prevention of decay in the timbers of wooden-built ships, and the fouling and oxidation of the plates of iron ships, have received considerable attention from the Admiralty and Merchant Shipowners, the following *resumé* of all the specifications at the Patent-office bearing on this subject is given:—

Dipping timber in boiled oil is a very ancient practice, and it would be difficult to trace its origin. In 1739, Alexander Emerton took out the first recorded patent for preserving wood from decay. He prepared the planks or boards with boiling oil in the then old way, and afterwards coated them with compounded poisons, powdered glass, and sand, cemented with painting colours and oils, laid on as paint. The next patent, which was for preserving copper, or plates of which copper is a basis, was granted in 1790 to Collins and Wyatt. They covered the plates with lead or tin. In the early part of the present century several chemists recommended decoctions, in the form of vegetable poisons, for saturating timber, and thus destroying all animal life in the green wood. None of these poisonous solutions seem to have succeeded, for, had they been found efficacious, their application would have been continued. There was then an interval, during which the stoppage of decay seems to have been abandoned, and dry rot allowed to take its course. In 1822, John Oxford secured a patent, whereby he undertook to prevent oxidation or decay in iron or wood, by preparing tar in such a manner as to stop the evaporation of the oil contained therein, saturating it also with chlorine gas. This purified oil is then mixed with 100 parts of white lead—or of the red oxide—25 parts of carbonate of lime, and 25 parts of purified coal tar added to the oil of tar. These ingredients are then applied as a paint. In the first days of iron in shipbuilding, rust was found to be a drawback to its general introduction. Scientific men saw the disadvantage, and sought to remedy the defect. Galvanic action, it was considered, would set all right, and the earliest patent in this direction was taken out by G. G. Bompass, in 1830. He sought to preserve metals from corrosion by an electric or galvanic process. For copper to be protected in sea-water he attaches an alloy of 9 to 10 parts of zinc with 100 parts of copper. In protecting iron he employed an alloy of tin, consisting of from 10 to 150 parts of tin combined with one of zinc. Following in the footsteps of Mr. Bompass, in the same year, Mr. John Revere patented an invention for fixing zinc protectors to the brace or stud of chain cables, and other iron surfaces exposed to the action of salt water. These galvanic zinc protectors were rivetted or soldered on according to requirement. It is known that one of the most distinguished of our electricians is in favour of inserting strips of zinc in the plates of ships; but if this principle proved correct in practice, it would long since have been universally adopted. Zinc plays an important part in patents for the prevention of oxidation. In 1837, Jacob Perkins got protection for a plan of coating copper tubes of boilers with a preparation consisting of two-thirds of zinc with one-third of copper; but he had been preceded in 1832 by Captain H. W. Craufurd, R.N., who proposed to preserve copper and iron from oxidation by coating with zinc paint in a fused state. Over this he laid a second covering of pure tin, or tin alloyed with lead. Captain Craufurd explains in detail his method of compounding the ingredients. In 1838, Le Comte de Fontainemoreau, considering Captain Craufurd's mode of fixing or adapting the zinc to this purpose as erroneous, applied for a patent of a more comprehensive description, for applying the zinc coating to metals. Again, in 1839, Mr. Thomas Dowling patented what he terms a conservative bath, applied to metals after grinding. He describes the machinery by which he effects this, the chief of which is a zinc wheel and galvanic vapour furnace.

In 1840, Mr. J. R. Neilson came forward with his invention for the application of a coating of copper, or copper

alloyed with zinc or tin, or both, to the surface of iron This was done by covering the mould to be cast with the material. In malleable iron, dried borax or flux is spread over the iron, which is then prepared with alloy heated to a temperature sufficient to melt copper, and, in its heated state, plunged into cold water to detach the scale of oxide. Mr. Arthur Wall, likewise in 1840, mixed 20 pounds of the strongest muriatic acid diluted with three gallons of water, then added 12 lbs. of steel or wrought-iron filings. The filings were heated to redness before mixture. The whole was then subjected to heating in a pan, &c., and the composition was then applied to prevent corrosion. In 1841, Mr. W. E. Newton employed silicates of potash, or soda, for making a plaster or coating to prevent iron from becoming rusty. After him came Professor R. Mallet, engineer, of Dublin, whose varied processes are of the most complex character. Finding that iron covered with zinc, when immersed in sea water, and certain fresh waters, gathered to itself a coating of carbonate of lime, destructive to the protective power of the zinc, and affording a surface for the attachment and growth of marine animals of the molluscous and testaceous classes, and aquatic plants, he applied chemical means to detach the scales of oxide from iron, and then plunged it into a preparing bath. After undergoing a series of processess, the metal is coated with an alloy or zoofagous paint, which paint is rendered poisonous by admixture of salts of metals, by means of which he sought to render the zinc effective as an anti-corrosive protector. In 1841, also, Mr. E. Morewood endeavoured to preserve iron from oxidation or rust by tinning it, and then dipping the tin covering or surface in molten zinc. Moses Poole, in 1845, claimed to possess an invention whereby he rendered iron more hard and durable, and free from oxidation, by the use of ferrocyanide of sodium, calcium, barium, or any other alkali, or alkaline earthy base ; to be used in a manner fully set forth in his specification. In 1846, Mr. Andrew Smith improved upon the plans for melting the zinc. He employed a bath of lead or tin, or any composition or medium that melts at a lower degree of heat than zinc, by which means the heat from the fire of the furnace is taken up and transmitted to the receptacle containing the zinc for melting. Baron Wetterstedt, in 1846, added the regulus of antimony to lead sheets, combined copper with antimony, made sheet metal by using lead and tin, and lastly, protected metals by paints thus prepared :—1st. One part of regulus of antimony to three parts of copper, mixed, melted together, run out into water, and then heated gently. Two parts of oxide of copper are added, and moistened with naphtha. The whole is then added to a composition of tar and naphtha. 2nd. Another paint is compounded of 30 lb. of tar, 30 lb. of pitch, 20 lb. of dried soot, 4 lb. of tallow from sperm oil, and naphtha added for consistency.

Mr. C. H. Paris, in 1849, coated metals with glass or vitreous matter. The metal went through a cleansing process. Gum water is then applied, and over this the dry or powdered glass is shaken, and then fused by heat till a glass surface is formed. Mr. Paris claimed the application of carbonate of soda for applying glass in this manner. Mr. J. Macintosh, in 1852, made a paint from decomposed india-rubber, in combination with oils or fatty matters, saponified by metallic salts, with lime for thickening the liquid. For bottoms of ships he recommends the india-rubber, when in a fluid state, to be combined with metallic soap, thickened with lime and coloured by pigments. Messrs. Hughes and Firmin, in 1852, manufactured lamp black from the vapour of coal tar, dead oil, dead oil salts, coal pitch, naphtha, linseed oil, and other materials. From the products a fuel is produced, and this residue has by another inventor been mixed with oils, ground, and made into a paint. In 1852, also, Mr. R. M. Glover took out a patent for a preparation of arsenite of lead and arsenite of copper, and the red and yellow sulphurets of arsenic. The proportion of each were as follows:—Two parts, by weight, of arsenite of lead, one of realgar, one of orpiment, and one of arsenite of copper. In the same year, Mr. J. Murdoch invented a variety of driers for zinc when the white of zinc is employed instead of white lead. The protoxides are manganese, cobalt, iron, tin, and nickel; for acids, the benzoic, urobenzoic, and the boric. In 1852, Mr. Binks patented a substitute for linseed or drying oils, in the products derived from dissolving what are called insoluble soaps. A pigment is then ground in this solution, and the paint is ready for application. The pigment may be white lead, oxide of zinc, lamp black, or any other. J. C. Medeiros, in 1853, proposed the use of mercury or quicksilver on iron plates for sheathing ships. The salts of mercury are dissolved, then a bath is formed, and the plates allowed to remain in the solution till their surface is equally and regularly amalgamated.

Mr. Newton, in 1854, made a paint from ground plumbago, pulverised charcoal, and the black soot formed by the burning of bituminous matter, along with ivory-black, or bone or lamp-black. Mr. Ryder also, in 1854, described a method for mixing gutta-percha with common resin, or tar, pitch, or asphaltum, dissolving them in impure benzole or coal naphtha. Mr. Newton took out a second patent, in 1854, for the production of a siccative black, brown, or grey pigment or colouring matter, by the admixture with the gas tar, or other organic substance to be carbonised for the purpose, of the oxides of potassium, sodium, calcium, aluminium, or other alkaline or earthy bases for paints. Mr. F. Ransome, in 1854, patented a mixture, consisting of ground oxides and carbonates of lead or zinc, and carbonate or sulphate of barytes with soluble silica. Mr. J. Rogers, in 1855, to prevent oxidation, deoxidizes metallic ores by a revolving cylinder, fitted with helical or screw-formed divisions to receive the ores in a pulverised state, and then submits the same to heat, and constant agitation by the revolution of the cylinder. Mr. B. Rosenburg, in 1855, manufactured a paint as follows:—100 lbs. of triturated white lead, $2\frac{1}{4}$ gallons of copal varnish, $1\frac{1}{2}$ gallon of spirits of turpentine, $1\frac{1}{2}$ gallon of linseed oil, and, for colouring, a small quantity of red lead. Before the metal is painted it is subjected to the fire for cleansing, and when cool the preparation is applied, then varnished with copal, and dried by a hot air process. Mr. J. E. Cook, in 1855, proposed a composition consisting of gum shellac, dissolved in methylated spirit or in wood spirit. In 1856, the patent of Messrs. Bancroft and White claims the manufacture of oils from petroleum, for preserving metals and ships' sheathing. Mr. A. F. Mennons, in 1856, obtained a patent for a non-conducting and inoxidable composition for metals, made thus :—

Argillaceous clays, containing a certain proportion of alumina	100	parts
Oily substances and residues	6	,,
Oil sediment	5	,,
Fat...	2	,,
Animal charcoal	2	,,
Mucilaginous substances, such as glue, &c. ...	2	,,
Wood sawdust, already employed in the purification of oils in the processes of dyeing	10	,,
Waste hair well beaten	4	,,

To the preceding materials a decoction of logwood and soot is then added.

Mr. J. M'Innes, in 1856, was granted a patent for coating metals with powdered emery stone mixed with a varnish of shellac dissolved in spirits of wine, with the addition of castor-oil. As emery contains 87 per cent. of aluminium, Mr. M'Innes considered that this paint would be solid enough to resist all action in the water, and never decompose. Mr. R. D. Atkinson, of Hull, in 1856, invented a plan for coating and protecting metals from oxidation, by depositing copper or brass upon surfaces of prepared iron, the deposit to be melted in conjunction with carbonic acid gas, the coating to be put on by a brush, or through the medium of galvanism. Depositing brass on iron

is now being successfully carried out at Portsmouth, by Mr. Wielan, on armour plates and other iron surfaces. Mr. A. Reid, mineralogist, in 1856, describes in his specification what he deems a sure way of preventing oxidation. He places the iron in a properly constructed furnace, then covers the metal with soot, or other matters possessing the like element; the temperature is then raised to red or white heat, and continued for half an hour, or according to the size of the iron operated upon. It is then suffered to cool, the surface is cleaned, and Mr. Reid asserts that a coat impervious to rust is formed. If this is verified by positive experiments, the cheapness and simplicity of the plan deserve to be widely known. Mr. Joseph Poleux, of New York, communicates, in the same year, a plan to overcome oxidation. He employs muriatic acid, nitric, or sulphine acid, of the ordinary degrees of concentration in commerce, without dilution, combined with the introduction of spelter into the cleansing process. In 1857 Mr. G. Bedson patented a new process. He melts a quantity of pitch derived from mineral tar, and a proportion of tar oil, with caoutchouc tempered with tar oil and shell-lac, the substance to be solid and elastic when cold. Mr. C. F. L. Oudry claims depositing copper on a preservative or intermediate coating instead of on the metal. He deposits copper in a pure state to any thickness on all metals. Mr. C. Iles, in 1857, described a means of applying earthy cements to metals. In 1858, Mr. J. Coutts received a patent for applying the following pigment by heated air:—

Carbonate of baryta	·650
Litharge	·065
Arsenious acid	·030
Asphaltum	·050
Oxide of calcium	·030
Creosote (oil of tar)	·175

Perhaps the most novel introduction is that patented here by Messrs. Bouchard and Clavel, the Paris bankers, in 1858. On the estate of La Gruerie, in Charney, Department of Yonne, France, is found an earth of the ochre description, called "Burgundy Red." This earth contains most valuable properties, and is said to be an exceedingly good preservative against rust. It is used as a cement and paint by admixture with the following:—

Burgundy red	66 parts
Grease or oil	15 „
Lime	11 „
Unburnt earthenware, chalk, or Roman cement	8 „
	100 „

This is said to prevent oxidation if the earth is merely diluted with volatile oil. D. M'Crae, in 1858, was allowed a patent for preserving bottoms of ships from fouling or decay. He applies grease from the cells of boiled bones, kitchen-stuff, and butter without salt; a poisonous matter is mixed with these fatty substances. Mr. G. P. Lock, in 1858, made a composition for the under coating of iron ships, made from iron ore ground in boiled linseed oil 50 per cent., oil of turpentine 50 per cent., well mixed. For the outer coatings, white lead 40 per cent., blue mineral or copperas 10 per cent., and oil of turpentine 50 per cent. In 1859, Mr. Henry, on the part of Moisant and Co., sought protection for bituminous products and compounds of bitumen for preventing oxidation. Mr. T. J. Laballe made a preparation of caoutchouc paints and colours for vulcanising. Mr. J. Crawford, of Liverpool, in 1859, applied for a patent for a metallic paint or varnish, composed of plumbago, or black lead, fine or gum varnish, arsenic, and spirits of turpentine mixed. Mr. F. W. Emerson, in 1859, prepared an anti-corrosive paint from oxi-chloride of lead, mixed and ground with oil, turpentine, varnish, or other vehicle. Mr. Weild, in 1859, sought to economise time and labour by a mechanical machine for applying paints to metals on large surfaces. Mr. James Meikle, in 1859, proposed coating iron ships with asphalte. In the same year, M. Auguste Pin dissolved sugar in muriate of zinc, then added wax and soap, in which was incorporated calcareous stones, phosphate of soda, sulphate of zinc, and copper, and the syrup of potatoes or sugar, with powdered marble, quartz, or felspar.

In 1859, Mr. F. G. Spilsbury, of Louvain, applied for a patent for the manufacture of a paint. He took sulphate of lead, and heated it to a red heat, either by itself or mixed with alumina or other earths; the pigment thus obtained to be washed first with sulphuric acid, then with water, when it is finally dried. Previous to drying the pigments they are digested with salts of tungstic acid, molybdic acid, titanic acid, tantalic acid, arsenic acid, acid of antimony, or other metallic acid, or with mixture of the above salts. A combination between the sulphate of lead and the metallic acid or acids is obtained, and the resulting pigments are dried in like manner after having been cleared from all adhering salts. The pigments may then be mixed with oil and used as a substitute for white lead. Mr. J. F. J. Lecocq, in 1860, prepared a calcareous varnish for coating iron and the bottoms of ships. Mr. H. Kemp, in 1860, patented a composition consisting of peat tar, wood tar, methylated spirit, peat oil, or linseed oil, arsenic resin, and carburet of iron, for preserving ships' bottoms. Mr. Allen's plan of making a coating or anti-corrosive paint for metals is thus given:—Ammoniacal liquid obtained from coal tar, or gas tar, prevents incrustation in boilers, and is applicable to painting the inside plates. Messrs. Pile and Smyth, of West Hartlepool, took out a patent in 1860. They employ a red composition and enamel, consisting of a combination of litharge, Venetian red, and pine varnish. Over this composition is applied a coating of resin, gums, or any pitch or bituminous substance, with the addition of coal tar, or oil. This is put on in a hot lava state, and the process is called enameling. An impermeable oil varnish was patented by M. Antoine Bonet in 1860, composed of 100 parts of alcohol, 100 parts of spirits of turpentine, one part of sulphuric ether, and one of carbonate of soda.

Mr. Robert Smith, shipowner, of Finsbury, applied to the Patent-office, in 1860, to protect his system for keeping vessels from fouling and worming. He applies equal parts of pitch, tar, resin, and turpentine, with any other adhesive compound. Assafœtida to be mixed with the foregoing, as a poison to destroy life. When the coating is laid on, and dry, the whole to be covered with paper or cloth. Mr. G. Hallett, in 1860, in his patent explains his method of protecting metal. He grinds the oxide of antimony to powder, then dries it, and mixes with it 12lbs. of linseed oil to the hundredweight of powdered oxide. Mr. Richardson, 1861, to prevent oxidation, would cover the metal with vulcanised india-rubber, cloth, or gutta-percha, the object sought being to provide for unequal expansion of the metal and coating. Mr. Francis Pulz, chemist, 1861, causes oxygen to be passed through sulphuric acid, to render the oxygen more active as an oxydising agent, as it combines, when so treated, with other substances for which it has an affinity, for manufacturing purposes. Mr. Pulz, also, in a second patent, submits oily matters to this oxidising agency, by causing the sulphurated gas to pass through them when in a liquid state. Mr. Martin Miller sends a communication, in 1861, for coating metals by metals or alloys in different ways. Mr. John Hay, in 1861, patented a drying oil. He lays a non-conducting coat, and then makes a paint by grinding in linseed oil the black or protoxide of copper, which is then boiled till reduced to the sub-oxide, and by thus oxygenating the oil he claims to have formed a quick drying cupreous oil. Mr. John Snider, of the United States, patented here a compound, in 1861, for coating metal. He reduces amorphous graphite to fine powder, and then mixes it with ore by the agency of a heated steam pipe. When cool and dry, one pound of oil is added to three pounds of the powder, and when the ingredients are combined, hot pure beeswax, in the proportion of one pound

of wax to 10 lbs. of graphite, is mixed. Afterwards linseed oil may be added. Mr. Snider details his manner of manipulating and preparing the graphite and ore. Messrs. Hallett and Stenhouse, in 1861, obtained a patent for the manufacture of pigments for coating surfaces. They employ native oxide of antimony, chemically treated in ways too intricate for explanation in this abbreviated outline, and mixed with red lead or litharge. They sometimes take type metal or worn-out types, reduce them to a coarse powder, and then mix them with their own weight of zinc, and calcine them. This produces a yellow pigment.

ON AILANTHINE.

The following paper, by Dr. ROBERT PATERSON (Corresponding Member), was read before the Botanical Society of Canada:—

There are few individuals who have not watched the interesting changes which take place in the larvæ of the *Bombyx Mori*, or common silk-worm, from the point of its exit from the egg until it has reached its full butterfly existence; and many there are who have been sadly disappointed at the mortality which comes over a brood of silk-worms in a single night from some cause or causes unknown, and consequently unremediable. Such epidemics are continually occurring in China as well as Europe, and constitute one of the greatest obstacles to the introduction of the culture of the silk worm into England. What occasions this sudden decimation of these insects has never been determined, but has long led to a wish, on the part of those interested, that a more hardy breed of silk-producing worms could be introduced into Europe, even though the produce was coarser, and of a worse colour, than the ordinary mulberry silk.

Recent information, through our missionaries in China, leads us to the knowledge that there is a considerable number of worms used by the Chinese, in different districts, for the production of various qualities and coarseness. These varieties of silk are used in China principally for the manufacture of dresses for the peasantry. Of late, however, some of these have reached this country, and have been considered durable and excellent. Could we but rear such silk in our country, as we hope shortly to be able to show that we can do, how much of the present overwhelming distress, which is visiting our manufacturing districts in consequence of the American war, might be avoided? Such material, if not used alone, might be mixed with cotton or wool; and thus many new and beautiful, if not durable, fabrics might be produced.

In 1814 Dr. Roxburgh* published an interesting memoir on the silk-producing moth of the East Indies, and soon afterwards the Arrindy or Palma Christi silk-worm was introduced into Europe. The castor-oil plant, in this climate and in the north of France, is but a delicate shrub; in the south of Europe, however, where the temperature never reaches the freezing point, it becomes a tree of very striking aspect, with large and rich tinted foliage. In such districts, therefore, the Arrindy moth thrives well, having plenty of food, undergoing its changes rapidly, and yielding five or six crops annually of silk of excellent quality. What was required for our climate, however, was an insect which, while sufficiently hardy to stand our cold springs and autumns, would also be regardless of storms, rain, dew, &c. Such a worm was first sent to Europe by the Abbé Fantoni, a Piedmontese missionary in the province of Shan Tung. He sent some cocoons, immediately after the first gathering in 1856, to some friends in Turin. The name of the tree on the leaves of which they lived was to him a mystery, but he described it as being like the leaf of an Acacia: so when the young brood hatched, various and many were the plants tried for their food, until the leaves of the *Ailanthus glandulosa* were presented to them; these they immediately ate greedily, and always preferred them afterwards to any other kind of food.

* Linnæan Transactions, Vol. 7.

There can now be little doubt but that the Arrindy or Palma Christi moth introduced into Europe from Dinajepore and Rungpore in Bengal in 1854, and the Ailanthus moth introduced into Europe from the province of Shan Tung in China, in 1858, are one and the same animal. The insects introduced in 1854 were delicate, and did not stand much lowering of the temperature; besides, the tree on which they fed perishes at 32° or 33° Fah. The insects introduced in 1858 were hardy, stood rain and cold, and the tree which they preferred is a hardy one in our climate. Those introduced in 1858, from China, would not eat the Palma Christi, and very naturally it was believed that they were different insects; upon examination, however, they turned out to be the same. Their changes, the colour of their larva, the character of the cocoon, the kind of silk, and the characterising marks of the moth itself pronounce them at once to be the same animal. But how have these animals acquired such different habits of taste? This can only be explained on the supposition that a long period of hardening in a temperate climate, like the province of Shan Tung, would produce in course of time a more hardy progeny, feeding habitually on a common plant of the country, while the more effeminate brood of Central India preferred as food the leaves of a plant which will only flourish in warm latitudes. Unless specific distinctions exist, it is clearly a bad plan to distinguish an insect from the peculiar plant it eats, for this may be a simple point of preference—if it cannot get the one it will eat the other, and thrive on it; besides, a long period of hardening will often enable an animal to live and thrive on a vegetable very different from its native food. We need only instance the ordinary *Bombyx Mori*, or common silk-worm, the finest varieties of which, after passing a year or two in our climate, will live and thrive, and spin beautiful silk on the common lettuce. Of the tree on which the ailanthus worm feeds, it may be necessary here to speak shortly; we shall have to describe the animal itself more fully afterwards.

It appears that the tree was originally introduced into this country by the Abbé d'Incarville, in 1751, as the "Vernis de Japon" tree, or that which yielded the famous Japan or China varnish. This turned out, however, to be a mistake, as the true Japan varnish tree has since been introduced into Europe. Since this latter introduction, the *Ailanthus glandulosa* has been known as the false varnish tree. It is a hardy plant in our climate, standing severe winters well, and producing an abundant crop of leaves, especially from young shoots, in early summer. It has no especial partiality for particular varieties of soil, thriving as well, and producing as abundant a crop of leaves, in the most barren soil as in the richest loam. It seems equally indifferent, too, as to the characteristics of the atmosphere in which it lives, healthy young trees being observable in the squares and smoky environs of London. The advantages of a plant such as this in the rearing of a hardy animal on its foliage need not be pointed out. Throughout France, generally, this tree flowers and seeds freely, and the seed sprouts and grows readily in Great Britain; but in addition to this method of propagation, another exists in the roots, which, if cut into pieces like the potato, spring forth and grow luxuriantly; no plant, indeed, can be more easily raised, or more easily increased when grown, than the *Ailanthus glandulosa*. But to enable this plant when grown to yield a proper supply of food for the ailanthus worm, it is necessary to cut it down and grow it ozier-like. In this way young shoots spring forth abundantly, and bear large and delicate leaves fitted for the young worm, and greedily devoured by the older ones. They have an additional advantage also that when the insects are placed upon them in the open air they are more easily protected by nets, &c., from the depredations of birds, insects, &c.

So much for the plant on which the animal feeds. Let us now turn to the insect itself:—I have already stated

that the ailanthus silk-worm was introduced into Europe in 1856. Its cultivators have not been idle since that time, as we find that M. Guérin Méneville endeavoured to introduce this worm into France. His first experiment did not succeed, but the following year he reared a satisfactory crop of cocoons in the open air; this, however, and all the efforts of the Société d'Acclimatation of Paris were not sufficient to effect the general introduction of the animal into France. It became necessary for him to show that agriculturists might derive a profit, and a good one, from the rearing of this insect.

Energetic, and thoroughly convinced of the success of such an experiment on a large scale, he induced personal friends to experiment on a larger scale at Toulon, in Provence, and at Chinon (Indre-et-Loire), the one being nearly in the south, the other in the centre of France.

At Chinon, for instance, 4,500 worms were placed upon flourishing thickets of ailanthus, which had been cut down and grown as bushes with that intention. Their development progressed satisfactorily, and they yielded 3,515 excellent cocoons, after suffering without injury, rains, heavy storms, and the attacks of birds and insects. The result of the experiment was a loss of about a fourth part, while the average loss of mulberry silk-worms is about one-half.

M. Méneville, after some careful experiments and calculations, which were submitted to the imperial government, has thus stated his profit and loss account, on the rearing of ailanthine, or the silk of this worm, produced in districts south of Paris.

	Francs
Twelve acres of ailanthus copse, share of expense of planting and annual expense of keeping up .	2,030
Average of receipts from two crops of ailanthine .	9,945

which leaves a balance of 7,915 francs for the twelve acres, or in round English numbers, £330 for twelve acres, or £27 10s. per acre. In India and China there are said to be six crops of silk annually; in the south of France two or three crops, but in the north of France and Great Britain two at most, and more securely one crop might be relied on. Let us take one good crop, and see how our profit and loss account would stand in Great Britain. The half of £27 10s. or £13 15s. would be the result, or about it; and be it remembered, for land, that after the planting of the *ailanthus* it requires no manure or tillage whatever, and the kind of soil being that on which nothing else would grow, provided always that it has as sheltered and sunny an exposure as possible. It always occurred to me that the climate of Canada would be especially favourable for the growth of ailanthine. The insect and the plant on which it feeds will stand any amount of cold; and when the Canadian summer arrives, rapid growth would take place in the tree, followed by hatching of the worm; in this way food would be speedily produced for the young brood, and two, if not three, crops of silk taken from the trees during the season. The experiment is one worthy of trial.

In England and Scotland, for the last two years, some experimenters have been at work, but as yet without any quantitative result. In the spring of 1862 I received, through the kindness of a friend, fifty eggs of the *Bombyx Cynthia;* they hatched in about ten days after their arrival; they were fed with cut branches of *ailanthus;* kept in the ordinary temperature of the atmosphere, but under glass. From the fifty worms (for the eggs all hatched) with all my inexperience, I had thirty-five large and fine cocoons, being a result not far short of that in the central districts of France. With more experience, and with growing plants prepared for the trial, I do not fear for the result of a quantitative trial in Scotland at any future year.

It is my intention, in describing this insect, to follow the different changes which it undergoes from the egg onwards until we arrive at the characteristic moth itself, from which distinctive marks and peculiarities are chiefly taken.

THE EGGS.—These are about the size of a large pin head, twice as large as those of the mulberry silk-worm, with which we are all familiar. They are yellow coloured, equally large at both ends, flattened from above downwards, and with a depression in their centre. They soon change their colour to a greenish black, the colour becoming more marked the nearer the point of hatching is at hand. The caterpillars are hatched from ten to fifteen days after the eggs are laid, according to temperature.

THE CATERPILLAR.—When the worm first escapes from the egg it is exceedingly minute; the colour of the segments of its body at this early stage is obviously yellow, but there are so great a number of black spots and dark coloured tubercles over it, as to give the impression that it is of a black colour; during the second period, that is to say after the first change of skin, the yellow colour becomes more marked, but the spots and tubercles are still black. During the third period they become nearly pure white, arising from the presence of a white mealy secretion over their bodies, destined, obviously, to protect them from rain or dew, as water will not fix on it; the spots and points of the tubercles are still black or bluish black.

During the fourth period the body is at first white, but gradually changes to a pale green, the tubercles assuming the same colour, and soon the head, the feet, and the last segment become of a golden yellow; the flowery secretion still, to a certain extent, exists, and there are always black points upon the segments or rings of the body.

During the fifth period the emerald green colouring becomes more intense, the points, as to segments, assume a soft black colour, and the extremities of the tubercles a marine blue. The caterpillar grows rapidly during this stage, eats largely and greedily till it attains the length of from $2\frac{3}{4}$ to 3 inches long, it then ceases to eat, becomes torpid for a few days, and, after fastening a few leaves together at the extremity of a leaf or branch, it begins its cocoon. Such is the general character of the changes which this caterpillar undergoes; but to enable those who may follow out this inquiry to know when these changes may be expected and the size of the animals in them, I will give a short table of my own experience, and that of my friend Dr. Gudwad, both in Scotland :—

Eggs hatched, 28 to 30th June	size	$\frac{3}{8}$ of an inch.
First change, 7 to 9th July............	,,	$\frac{1}{2}$,,
Second change, 13 to 15th July......	,,	1 ,,
Third change, 20 to 22nd July	,,	$1\frac{1}{4}$,,
Fourth change, 28 to 30th July......	,,	$1\frac{1}{2}$ to 2 inches.

From this time till the period when it begins to spin it rapidly grows till it reaches from two and a half to three inches long, depending upon the abundance and quality of its food.

The experience of my friend Dr. Gudwad is as follows:—Eggs hatched 19th September; 28th September first change began; 5th October second change began; 12th October third change began; 21st October fourth change began; 3rd November began cocoon. The temperature ranged from 47° to 55°.

THE COCOON.—I have already remarked that after a short period of torpidity when no more food is taken, and during which the remains of the undigested food are passed by the worm in abundance, it begins its cocoon by fastening some threads of silk to the end of the branch or leaf stalk, and, after binding some leaflets together, it spins its cocoon in the hollow thus formed. The colour of the silk is of a yellowish-brown very like, indeed, to that of a decayed leaf. In weaving its cocoon the worm leaves at its lower extremity an elastic opening for the exit of the moth. The threads at this opening are not cut across, but simply turned and laid one over another. The silk of this worm has not as yet been unwound in a continuous thread; this, doubtless, arises from the substance which glues the threads together, requiring some other solvent

than the warm water which so readily effects the solution of the gummy secretion of the mulberry silk. This, however, cannot long remain undiscovered in this country, as a chemical solvent for this secretion will doubtless ere long be found.* In China even there is reason to believe that this has been accomplished, as the last examples of *ailanthine* from that country are stated to leave no doubt of their having been unwound from the cocoon. Even the carded silk of this worm is abundantly used. In China it forms the most durable dresses of the peasantry, dresses which are often handed down from father to son. In France this "flosille" or floss silk is abundantly used for weaving with thread and wool and in the manufacture of fancy stuffs. At Roubaix, Nismes, and Lyons, it is imported from abroad in large quantities to the extent of 1,290,000 kilogrammes annually.

Mons. Geoffrey St. Hilaire, President of the Société d'Acclimatation of Paris says:—"Here is the report of the weavers at Alsace, who have made use of ailanthus silk. M. Schlumberger has found the cocoon very easy to card and spin; the thread obtained is less brilliant, strong and rough; it left no residue, not more than in combing the thread. It is a most excellent stuff for use in all manufacture where *burre* is employed. The cocoons are easily cleaned, and they will take a good dye. This culture, made on a great scale, will furnish in abundance a finer and stronger floss than the mulberry silk-worm. The worm remains in the cocoon in the chrysalis condition for from twenty-six to thirty days, at which time the moth makes its appearance, coming quickly and easily through the valvular opening at the extremity of the cocoon. At this time its wings are moist, soft, and folded up; and, naturally, upon emerging from the cocoon, it seizes hold of the lower part of it, thus allowing its large wings to drop, become unfolded, and stiffen. If this precaution is not taken when the moths are allowed to exit artificially, their wings never expand, but remain crumpled up, the moth never regaining much activity with its wings in this state, and seldom connecting itself with the opposite sex. In rearing these moths, therefore, it is of consequence to observe that upon their exit from the cocoon they have some substance on which they can climb up and allow their wings to hang down and become expanded.

The moth has been long familiar to us, in collections of Chinese butterflies, brought to this country. It is large, the expansion of its wings being about five inches; the head and antennæ are greyish brown, the latter strongly pectinated; thorax and abdomen lighter grey; wings, with a broad transverse light-coloured band near the middle, the space within which (forming nearly an equilateral triangle) is brownish grey, and that without ash colour, running into brownish grey at the margins of the wings. Just within the margins there are two narrow brown streaks running parallel with them, somewhat interrupted before reaching a black spot near the apex of the superior wings; this spot is surmounted by a white crescent, and a zigzag white line runs from it to the tip. The basal portion of the superior wings is traversed by an ash-coloured bar commencing on the posterior edges next the shoulder, and after continuing in nearly a straight line for about half an inch is suddenly deflected and terminates on the anterior margin, between this bar and the transverse scapula line there is a pale longitudinal spot surrounded with black. The under wings likewise bear a similar spot but more crescent-shaped, and towards their base there is an ash-coloured arched bar bounded on the outer side with black. The under side differs principally in being paler and destitute of the angular and arched bars at the base of the upper and lower wings.† These moths, when in health and especially in sunshine, connect themselves and lay eggs in a few days. If they do not develope their wings, or the temperature is low and without sunshine, the males do not seek after the females, hence the eggs laid are often, under these circumstances, unproductive.

* It has been stated by some that the cause of the silk not winding off results from the slanting opening at the bottom of the cocoon, admitting water, and thus sinking it and breaking the thread. This explanation is not satisfactory and is inconsistent with fact.

† Sir H. Jardine's description of *Saturnia Cynthia*, and corresponding in every particular to *ailanthus* silk moth.

CITY OF LONDON COLLEGE.

The annual distribution of prizes and certificates gained at the Society of Arts Examination, 1863, and also the City of London College prizes and certificates, took place on Thursday evening, 29th ult., in the lecture-room of the College, Leadenhall-street. The Lord Mayor presided.

The Secretary read the report, from which it appeared that marked success had characterised their efforts for the educational benefit of the young men of the metropolis. The average number of students during the Michaelmas and Easter terms exceeded 800. The students of the college who had presented themselves at the annual examination held by the Society of Arts had more than maintained its former reputation. They gained no less than 10 prizes out of 50 awarded by the Society. One of their students, Mr. William Vaughan (recently elected a professor), had this year obtained the Prince Consort's prize of 25 guineas. Upon the subject of finance, the council regretted to have to record a deficit of about £154 13s. 2½d. on this year's working, which, added to the deficit of £52 15s. 7d. in last year's account, makes a total deficit of £207 8s. 9½d. This had arisen from the great expense of working an Institution mainly dependent upon the small fees which the students pay, and from the loss of sub-lettings, through the increase in the number of classes and consequent additional demand for class accommodation. The Council had been reluctantly compelled to re-arrange the scale of class fees, with the view of making all the classes more nearly supporting. The Council earnestly desire to remind their friends and the public generally that the sum of £700 must yet be raised before the amount specified as required for the permanent establishment of the College is completed; until this sum is raised the Institution is always liable to report a painful deficiency in its funds, and the usefulness of the College will, by consequence, be much impeded.

The Bishop of London, after a few introductory remarks, said he was quite sure that all present, and, in fact, all in the country, would feel the great loss they had sustained by the death of Mr. Cubitt, which had occurred that day. His lordship eulogised his great personal and public qualities both as a private and public man. His loss to the College was the more to be deplored, seeing that the interest he took in it contributed in a very large measure to the success which it had obtained. The old times when the apprentices of London lived in their masters' houses, had passed away, and the young men now lived by themselves. To meet this change great efforts had been made, and in aid of these efforts that Institution, the City of London College, was established, to protect them against temptation, and provide for them innocent and instructive occupation during their evenings. Viewed in this aspect, the real good done by the Institution during the last two years was very great indeed. But they were engaged in doing something more than this. The Institution held out to young men a motive that by making good use of their time they could do much to secure their rise in life, for in this free country the road open to eminence was one of honesty and perseverance. Other means, of a discreditable nature, might raise men in life in tyrannical countries, but that was not the case with free Englishmen. Thousands of examples were around them of young men who had raised themselves by their honesty and perseverance, and more especially in that city. Every profession, even the aristocratic professions, abounded with such examples. Still men might deserve to rise without being able to rise; but it

was in every young man's power to attain such a degree of improvement as to deserve to rise; and the very possession of these capabilities was in itself an incalculable good. They could all make use of the opportunities which God afforded them. But after all, these were but secondary motives for young men joining that Institution. The chief motive for doing so ought to be a desire to cultivate what God had committed to their trust, to improve the gifts of God, and enable themselves to perform well their part in life. If a man was to perform the duties which God had laid upon him, he must cultivate his intellect; such was the inevitable condition of all success in the age in which they lived. And to those who had to struggle with life, and who might think the pursuit of intellectual culture difficult under the circumstances, he would say that young men born and brought up under easy circumstances had far greater difficulties to contend with, as every one who had any knowledge of education was aware. Young men who had everything to do for themselves could acquire knowledge with less difficulty than those who had everything done for them; and difficulty itself in the acquisition of knowledge spurred on those in search of it to overcome the difficulty. There was no solid acquisition without effort; and as an example of efforts successfully made in this direction, they could not have one more forcible or more illustrious than that of the late Prince Consort. They knew that the education that a man gave to himself was always the best, and that was the sort of education the young men were seeking in that Institution—education only to be got by the hard work of their own minds. The study of languages, as pursued within those walls, was no part of the process of training the mind, but rather the acquisition of an instrument which would be of use in the business of life; but such of them as could give the time and attention necessary to mathematical subjects would find this study a real training of the mind. That College had a great advantage over others—it was self-governing; the young men themselves were part of the governing body, and nothing was more likely to conduce to the stability and usefulness of the Institution. It was that system of self-government which had secured permanent life to all the institutions of the country, and he hoped that principle would be always adhered to in this College, as well as in the great seats of academical learning of England. The library and the classes offered advantages which no doubt they would avail themselves of, but let them not hope to make much progress by listening to lectures. The classes, however, were what they must look to—the classes were the most valuable part of the Institution, the only real means of intellectual culture, and the only test of progress. Examinations also were of great use; everybody now had to pass examinations. The Lord Mayor and himself (the Bishop) were, he believed, the only two persons who now could attain their present positions without being competitively examined. As to religious instruction, with respect to which he had a privilege to speak, he did not know well what that instruction meant if it was not to enable men to live better in the eyes of God and of man. He knew no other test of religious instruction than that which was derived from the Christian life of a man. He hoped the young men educated in this College would so profit by the instruction afforded, secular as well as religious, as to be always on the right side in the conflict between a pure Christian life and vice; and that they would always be able to see God in His works.

The right rev. prelate then distributed the prizes gained at the Society of Arts examination, of which a list has already appeared in the *Journal*, and the College Prizes, as follows:—Scholarship: Hugh Lloyd Hughes. Associates: James Lewis Herman Hempleman, Hugh Lloyd Hughes, and James Rigby Smith. T. Prince, the Greatorex prize; A. C. Maybury and A. Day, the Louth prize; J. R. Smith, the Essay; G. J. Stancliff, arithmetic; A. Day, book-keeping; A. C. Maybury, chemistry; F. S. Donaldson, divinity; H. L. Hughes, first French; H. Brain, second French; T. Prince, German; A. C. Maybury, Latin; W. Price, Spanish. Also numerous certificates.

The following resolution was proposed by the Rev. C. Mackenzie, and seconded by Mr. Alderman Finnis:—"That this meeting, representing the friends and supporters of the City of London College, desires to tender its best thanks to the Society of Arts for the liberal encouragement received at their hands, as manifested by the prizes and certificates this day distributed."

Mr. WINKWORTH. a Vice-president of the Society, said that in the absence of their chairman, Mr. Hawes, who had been called from London on special business, and of Mr. Harry Chester, who was prevented, much to his regret, by sudden indisposition from being present on this occasion, it became his duty to return thanks for the complimentary resolution just passed, in which credit was given to the Society of Arts for the liberal encouragement they continued to give to the system of examinations. In the discharge of this duty, he must also thank the meeting for the cordial manner in which they had then, as always, received the name of Mr. Chester, who, as he had that day informed him by letter, though physically unable to attend, was present in heart. The Society of Arts, though more than one hundred years of age, was practically younger than ever, for, being always in the van of progress, it was successfully inaugurating with the vigour of youth some of the most important social and educational movements of the nineteenth century. Of these he need only mention the establishment of International Exhibitions, and of the system of examinations, which had that evening received such gratifying illustration, both of which stood out in bold relief as valuable contributions to the moral, intellectual, and material welfare of society. It was with the second of these they had that evening to do. In the course of the admirable speech with which the Bishop of London had favoured them, his lordship had not spoken quite so eulogistically of the system of Examinations as of some other educational appliances on which he had enlarged, and had to his (the speaker's) mind hazarded a doubt as to its proper position in the order of modern instruction. He did not, however, deem it necessary, especially at that late hour, to attempt a defence of the system, and it would be sufficient for his purpose to ask the meeting to contrast the bald routine of education, falsely so called, which obtained when he was a young man, with those enlarged means of mental development which were so much strengthened by the modern system of frequent examinations. Instead of simply "saying their lessons," as it used to be called, by rote like parrots, students were now required to show that they really understood what they had learnt. As regarded current history, such as copious newspapers now supplied, the youth of 50 years ago were obliged to content themselves with such dwarfed specimens of historical literature as he held in his hand—a *Times* newspaper, dated May 26th, 1809, of four pages, each containing letterpress of 12 by 18 inches, and for which the price charged was 6½d. Little real instruction could be extracted from such scanty materials. Working Men's Clubs and Reading-rooms could have had no food for existence if their reading were confined to such a mockery of newspaper literature as this. The spread of education, to which Examinations had given so great an impulse, had provided a source of instructive amusement in matured life, infinitely preferable to the ignorance and vice by which the leisure hours of too large a portion of the working classes were formerly debased. For the recognition of the important position the Society of Arts had been privileged to occupy in this movement, he begged again to thank the meeting as their representative.

A vote of thanks was proposed by the Rev. R. WHITTINGTON, and seconded by Mr. WALFORD GREATOREX, to the Honorary Examiners and Essay Adjudicators, which was replied to by Dr. WINTZER.

A vote of thanks to the professors, teachers, and lecturers, was proposed by the Rev. W. WINDLE, seconded

by Mr. Montague Gore, and replied to by Mr. F. Reynolds, on behalf of the professors.

Mr. P. L. Simmonds proposed, and Mr. E. G. Clarke seconded, a vote of thaks to the Bishop of London.

The Bishop having replied,

The Rev. J. Maskell proposed, and Mr. Thomas Whittington seconded, a vote of thanks to the Lord Mayor, which having been acknowledged, the proceedings terminated.

Proceedings of Institutions.

Burnley Mechanics' Institution.—The report for last year says that the great and prolonged calamity which has fallen upon the industry of this populous district has sensibly affected the Institution in its finances and the extent of its operations. Strong as the claims of the Institution upon the public undoubtedly are, the directors have not deemed it expedient to make any general appeal for assistance, while such large local effort has been required and put forth to meet the urgent necessities of the operatives in their deep distress. Nor could the directors calculate upon the usual benefit from the annual festival. The aim of the directors has been to maintain the efficiency of the leading departments of the Institution, and to exercise the most vigilant economy over all, trusting to the return of prosperous times for the removal of any debt which might be incurred. The expediency of a more restricted supply of newspapers and periodicals to the reading-room has been repeatedly under discussion, but these discussions have tended to show the necessity of a more liberal rather than a more limited supply. The reading-room has, during these times of scant employment, been much frequented, by many no doubt for information and improvement, and by not a few, it may be surmised, to while away time or to dispel gloomy reflections. With this large attendance of readers to provide for, no material reduction in the expenditure of this department could well be effected. A similar remark will apply to the evening classes; the distinction which the Institution has acquired in this most useful and important branch of its operations the directors have been anxious to preserve. A competent staff of teachers has therefore been retained, whose skill and assiduity are evinced by the general improvement of the members. The honour of the Institution has been well sustained in the usual examinations. The success of its members in these laudable contests has been quite as marked in this as in former years. Several have had prizes and honours awarded by the Society of Arts; several have received prizes and certificates from the Department of Science and Art; and in the East Lancashire examination, two-fifths of the entire amount appropriated by the council for prizes were gained by candidates from the Burnley Mechanics' Institution. It is due to the Art-master, Mr. Hale, and to the organising master, Mr. Clement, to state, that the drawing-class in charge of the former has made very commendable progress, and has received during the year an increase of members. The chemistry-class established by the latter has had a considerable accession of members, while the general application and progress of the class is highly commendable. Both these classes have gained high distinction in the recent examinations. The library register shows a remarkable increase in the circulation of books during the year, the number of volumes issued being 8,442; unbound publications, 703; volumes circulated by the book club, 240; total circulation, 9,385; total during the previous year, 7,197; increase, 2,188, or nearly two-sevenths. With respect to the Exchange very little alteration can be reported. The directors have given their best attention to all representations from its members, and have been induced to make some addition to the various publications supplied to the room. The list of subscribers for the year 1862 includes 192 residents, and 89 non-residents, making a total of 281; in 1861, the list included 164 residents, and 119 non-residents, total, 283; decrease since 1861, 2 only. The number of names entered in the class registers for the quarter commencing October 1st is 215; comprising, males, 154; females, 61. In the corresponding quarter of the year previous the number was 345, comprising 218 males and 127 females, showing a decrease of 64 males and 66 females, and a total decrease of 130 members. The number of members of the Institution not connected with the Exchange was, on the last quarter of 1862, 364; in the year 1861, 502; decrease, 138. The annual balance-sheet shows a deficiency of receipts amounting to £30 14s. 7½d., which being added to that of last year, augments the debt to £31 11s. 2½d. Application having been made by the Relief Committee and the Board of Guardians for the use of certain parts of the Institution, the directors felt it their duty to accede as far as possible to the wishes of both. This has been attended with considerable inconvenience to the members of the Institution and the Exchange; it has certainly been submitted to with much forbearance. Arrangements will, however, be made to mitigate the inconvenience as far as possible. In concluding their report, the directors express their admiration of the exemplary conduct of the operatives in their great distress. The sustained patience under prolonged and trying privations; the calm fortitude with which numbers have seen the savings of years exhausted; the profound tranquillity of this great population under a crisis so unexampled, present a study to the statesman and the philanthropist of the deepest interest. To what can this fortitude, this love of order, this respect for the law be ascribed? Are they not signs of general intelligence? And may not this again be regarded, in a great measure, as the result of improved and extended educational agencies, amongst which Mechanics' and Literary Institutes hold no mean rank?

Farnham Young Men's Association.—The third triennial report speaks of nine years of continuously increasing prosperity. The Committee feel that the library is one of the most important agents for good in the constitution of the Society, and it has been their constant endeavour to place upon its shelves only such books as are of an unexceptionable moral tendency, as well as instructive and amusing. The cost of many expensive works of reference, which were purchased during the year 1861, caused a deficiency in the balance-sheet of that year, and in consequence not quite so many books as usual have been purchased during the present year. The cost of binding has now become a heavy demand upon the limited sum available for the purchase of books, and the Committee earnestly press upon the members the importance of taking care of the books whilst in their possession. The library now numbers 1,509 volumes, an increase of 571 volumes since the publication of the last report. The money expended on it during the three years has been £138 1s. 9d., or an annual average of £46 0s. 7d., the average of the three previous years being just under £49. The issue of books for home reading has been rapidly increasing. Between October 1st, 1858, and October 1st, 1861 (the returns being made up and reported at the commencement of each lecture session), no fewer than 10,578 volumes were issued to the members, and 2,626 monthly parts of periodicals. The average number of members during the three years was 280, of whom only about one-half avail themselves of the library. The museum of natural history, geology, numismatics, and objects of general interest, has entirely outgrown the space available for it in the present reading-room. The Committee hope that more space may become available on some future day, and they beg to offer their best thanks to all those who have contributed objects of interest to the collection, and to Mr. R. O. Clark, the Curator, under whose sole management it is, for the time and trouble he must have devoted to it. The expenses of the museum are not

charged upon the general funds of the Association, but are paid by the Curator with money specially collected by him for that purpose. About thirteen lectures have been given each session, besides entertainments given by the elocution section. The receipts and expenditure of the last three sessions have been as follows:—

7th Session.—Receipts...	£25 5 3	Expenditure...	£19 14 1
8th Session. ,,	20 6 9	,,	26 19 10
9th Session. ,,	24 6 6	,,	22 2 7
	£69 18 6		£68 16 6

The issue of tickets, at 3d. each, for the admission of the labouring classes to the lectures, continues to increase. Before the commencement of the session 1861–62, the lecture-room was thoroughly cleaned, painted, &c., at a cost of nearly £9, one moiety of which was paid by the Choral Society. The state of the funds has varied during the last three years, owing to several causes, and especially that in 1861 no donations were received at all equal to those received in 1859 and 1860. The balance-sheets from 1859 to 1861 give the following totals, the accounts being made up to the end of December in each year:—

1859 Receipts	£103 1 4	Expenditure	£ 96 11 0
1860 ,,	141 16 1	,,	134 14 9
1861 ,,	125 15 7	,,	131 19 4

MEETINGS FOR THE ENSUING WEEK.

MON. ...Royal Geographical, 8½. 1. Baron Charles von der Decken, "On the Snowy Mountains of Eastern Equatorial Africa, with map." 2. Last letter of the late Mr. Richard Thornton to Sir Roderick Murchison, from Shapunga, on the Zambesi. 3. The Nile Expedition—Latest intelligence of Dr. Baike. 4. Letters of the late Dr. Vogel from the interior of Africa.
Medical, 8½. Mr. Wm. Adams, "On the Treatment of Disease of the Spine and Angular Curvature."

TUES. ...Civil Engineers, 8. Mr. William Parkes, "Description of Lighthouses lately erected in the Red Sea."
Syro-Egyptian, 7½. The Rev. B. Harris Cowper, "On the old forms of Worship at Ascalon."
Ethnological, 8.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, October 30th*, 1863.]

Dated 23rd June, 1863.

1576. A. R. Stocker, Wolverhampton—Imp. in preparing and fashioning iron applicable to the manufacture of boot heels, tips, and horse shoes, and in part of the machinery or apparatus to be employed therein.

Dated 28th July, 1863.

1871. A. Hector, Montrose—Imp. in means or apparatus for facilitating the catching of fish.

Dated 2nd September, 1863.

2165. M. Pinner, 12, South-terrace, Grosvenor-park, Camberwell—The manufacture of a flexible translucent material or fabric to be used as a partial substitute for glass. (A com.)

Dated 8th September, 1863.

2207. J. Burch, Cragg Works, near Macclesfield—Imp. in printing on certain and other terry and velvet pile carpets, felted cloths, and other fabrics and materials, and in the processes and apparatus connected therewith.

Dated 19th September, 1863.

2308. J. Fraser, 12, South-terrace, Grosvenor-park, Camberwell—An improved method of constructing magazines for the safer and more economical storing of volatile oils in localities where the ground and labour are expensive. (A com.)

Dated 24th September, 1863.

2360. H. A. Bonneville, 38, Porchester-terrace, Bayswater—Imp. in horse collars. (A com.)
2361. H. A. Bonneville, 38, Porchester-terrace, Bayswater—Imp. in joining leather. (A com.)

Dated 26th September, 1863.

2375. E. B. Wilson, 5, Parliament-street, Westminster—Imp. in furnaces and fire-places, applicable to the heating of steam boilers and other purposes.

Dated 30th September, 1863.

2396. E. S. Attree, 37, Gibson-street, Waterloo-road, Lambeth—An improved cigar holder. (A com.)

Dated 1st October, 1863.

2400. W. Smith, 4, South-street, Finsbury—An improved process for re-crystallising sugar.
2402. T. Bell, Wishaw, Lanark, N.B.—A new mode of manufacturing bricks and tiles.
2403. H. A. Bonneville, 38, Porchester-terrace, Bayswater—Imp. in railway and other breaks. (A com.)
2404. L. N. Le Gras, Rathbone-place, Oxford-street—Imp. in cooking stoves and apparatus.
2406. J. Bell, Linton, Cambridgeshire—Imp. in couplings for railway carriages.
2408. G. Dickey, Southwark—Imp. in winkers or eye-screening apparatus for horses and other animals.
2410. T. Horsley, 10, Coney-street, York—Imp. in breech-loading fire-arms.

Dated 2nd October, 1863.

2412. J. Farrar, Halifax—Imp. in machinery or apparatus for spinning and doubling wool, alpaca, mohair, cotton, silk, flax, and other fibrous substances.
2416. J. G. Tongue, 34, Southampton-buildings, Holborn—An improved compound reactive agent and universal mordant to be employed in the processes of dyeing and printing. (A com.)
2418. J. J. Lundy, Leith, and R. Irvine, Musselburgh—Imp. in the manufacture of paper.
2420. G. T. Bousfield, Loughborough-park, Brixton—Imp. in revolver fire-arms. (A com.)
2422. J. Bowron, South Stockton, Yorkshire, and G. Robinson, Welbeck-street, Cavendish square—Imp. in the manufacture of soda.

Dated 3rd October, 1863.

2424. G. R. Tilling, Birkenhead, and J. Park, Liverpool—An improved mode or method of filling tobacco pipes of an improved construction.
2426. T. Fagg and J. Fagg, Panton-street—Imp. in the manufacture of boots and shoes.

Dated 5th October, 1863.

2430. C. Brakell, W. Hoehl, and W. Gunther, Oldham—Imp. in motive engines worked by water, steam, or other motive-power. (Partly a com.)
2432. C. Tomlinson, Grove-vale Cottage, Great Barr, Staffordshire—Imp. in taps, cocks, hydrants or valves, and apparatus connected therewith, for opening, closing, regulating and facilitating and otherwise controlling the passage or flow of water, air, steam, gas, and other fluids and liquids.
2434. W. H. Bailey, Keighley, Yorkshire—Imp. in machinery for combing wool and other fibrous materials. (Partly a com.)
2438. J. Towlson, Heigham, Norwich—Imp. in apparatus for cooling liquids.
2440. W. Legg, Liverpool—Imp. applicable to sewing machines.

Dated 6th October, 1863.

2442. E. Whitehouse, Wolverhampton—Certain imp. in the manufacture of wrought iron shackles.
2446. G. Dyer, Regent-street—Imp. in the construction of railway carriages.

Dated 7th October, 1863.

2450. E. Leak, Longton—Improved apparatus to be used in placing "glost" china and earthenware in ovens and kilns for firing, burning, or baking such ware.
2452. G. F. Graham, Upper Gordon-street, Euston-square—Imp. in high pressure cocks.
2454. C. P. Button, 27, Leadenhall-street—Imp. in pumps. (A com.)
2456. R. Zox, Nelson-square, Blackfriars-road—Imp. in the manufacture of academic caps.
2458. E. Slaughter, Bristol—Imp. in locomotive engines.
2460. G. Whight, Ipswich—Imp. in washing apparatus. (A com.)

Dated 8th October, 1863.

2462. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in propelling ships and in the apparatus employed therein. (A com.)
2464. C. Crosswell, 8, Salisbury-street, Strand—Imp. in breech-loading fire-arms. (A com.)
2465. M. Smith, Bushfield House, Donnybrook-road, Dublin—Imp. in washing, cleansing, salting and packing butter, and in apparatus to be employed therein.
2466. G. Canouil and F. A. Blanchon, Paris—Shooting toy fusees, toy rockets, or other similar toy missiles, by means of toy pistols or other toy fire arms.
2468. J. D. Dougall, 59, St. James's-street, Westminster—Imp. in "camel guns" and other light artillery, which imp. are also applicable to "punt guns" or other heavy fowling pieces or rifles.
2472. A. V. Newton, 66, Chancery-lane—Imp. in the construction of condensers. (A com.)

Dated 9th October, 1863.

2474. J. Wood, J. Whitehead, and T. Tetlow, Oldham—Certain imp. in machinery or apparatus for governing the speed of steam engines.
2475. J. Elsom, 10 and 11, Regent's-row, Dalston—Imp. in parallel turning, and in machinery for that purpose.
2476. E. W. James, Brynllys, Cardigan—Improved apparatus and arrangements for giving buoyancy to or raising sinking or submerged ships and other sinking or sunken bodies.
2478. J. McInnes, Liverpool—Imp. in sheathing for navigable vessels of iron or wood, which sheathing is also applicable to the covering of roofs, walls, and other purposes.
2481. N. Fellows, 123, Chancery-lane—An improved mode of extinguishing fires in chimneys and flues, regulating and promoting draught therein, calculated also to act as a ventilator.

Dated 10th October, 1863.

2484. G. W. Reynolds, Smethwick, Staffordshire—An improved manufacture of bands or strips for crinolines.

2488. W. B. Fairbanks, J. Lavender, and F. Lavender, Walsall, Staffordshire—Imp. in the manufacture of hames.

Dated 12th October, 1863.

2492. A. Inglis, 53, Arthur-road, Holloway—Imp. in taps or cocks, part of which imp. is applicable to the lubrication and protection of the journals of revolving shafts, axles, or spindles.
2494. W. Hutchison, 21, Cardigan-street—Imp. in the manufacture of fittings for powder flasks.
2498. T. Browning, Liverpool—Imp. applicable to metallic casks and the machinery for the manufacture of the same.
2500. T. Fox, Ballingdon (near Sudbury), Essex—Improved apparatus for cleaning out the tubes of steam boilers, which apparatus is also applicable for cleaning out other tubes.

Dated 13th October, 1863.

2506. J. Dodge, Manchester—Imp. in machinery for rolling, shaping, or forging metals, and in apparatus for grinding and polishing the same.
2508. J. E. Poynter, Glasgow—Imp. in throwing projectiles by means of explosive agents, and in apparatus therefor.
2509. J. Place, Hoddlesden, Lancashire—Improved application of certain schistous or shaly materials to the manufacture and finishing of paper.
2510. A. Rolfe, Amwell-street, Pentonville—Imp. in means or apparatus for propelling carriages on railways, tramways, or on common roads.
2512. T. Scott, 31, Nelson-square, Blackfriars-road, Southwark—Imp. in floating docks.

Dated 14th October, 1863.

2516. J. Inchley, Birmingham—Imp. in valves for double cylinder steam engines.
2518. M. F. D. Cavalerie, 10, Rue de la Fidélité, Paris—Certain imp. in obtaining centrifugal motive power.
2520. W. J. Rideout, Bolton, Lancashire—Imp. in boiling rags and other paper making materials.

Dated 15th October, 1863.

2525. P. Lesley, Morley's Hotel, Strand—Imp. in the manufacture of rails for railways. (A com.)
2527. S. R. Smith, 7, Delamere-street, Paddington—Imp. in apparatus for connecting chain cables, and for clearing a ship's hawse when foul, and also in apparatus for acting on and preventing strain to the chain cables when ships are riding at anchor.
2529. B. F. Weatherdon, Kingston-on-Thames, Surrey—A new apparatus for rubbing off or removing the dust or dirt from boots and shoes.

Dated 16th October, 1863.

2531. J. Polglase, Bodmin, and J. Cox, Manchester—Improved apparatus for boring and cleaving stone.
2533. R. A. Brooman, 166, Fleet-street—Imp. in pumps to be worked by steam. (A com.)
2534. F. A. E. Guironnet de Massas, Hoxton—Imp. in smut machines, and in machines for cleansing and peeling grain and seeds.
2536. S. Jay, Regent-street—Imp. in the manufacture of stockings and drawers.

Dated 17th October, 1863.

2537. M. Meisel, Park-walk, Brompton—Imp. in apparatus for ascertaining the weight of the load supported by the springs of railway locomotives and carriages for the purpose of regulating and equalising such load. (A com.)
2539. J. Shanks, Barrhead and Greenock, N.B.—Imp. relating to water-closet and other valves or taps.
2540. W. Hampson, jun., Dukinfield—Certain imp. in looms for weaving.
2541. W. Routledge and F. F. Ommaney, Salford—Certain imp. in "baling boxes" used in packing cotton or other fibrous materials.
2542. W. Clark, 53, Chancery-lane—Imp. in rotary engines. (A com.)
2544. W. Clark, 53, Chancery-lane—Imp. in sewing and embroidering machines. (A com.)
2545. L. R. Chesbrough, Brooklyn, U.S.—An improved let-off motion for looms. (A com.)
2547. W. Darlow, North Woolwich-road, and R. H. Lawson, Victoria-terrace, Victoria-docks, Essex—Imp. in apparatus or means for obtaining motive power.
2548. J. Wright, Rochester—Imp. in machinery for cutting railway sleepers to receive railway chairs.
2550. F. De Wyldé, Trinity-square, Tower-hill—Imp. in the induration of stone, cement, stucco, brick, or other analogous materials, also in the manufacture of artificial stone.
2551. F. De Wylde, Trinity-square, Tower-hill—Imp. in the separation of molasses and other impurities from sugar crystals. (A com.)

Dated 19th October, 1863.

2552. J. Champion, Manchester—Imp. in machinery or apparatus for preparing, spinning, and doubling cotton, flax, wool, and other fibrous materials.
2558. W. Clark, 53, Chancery-lane—Imp. in separating ores from their gangues, and in apparatus for the same. (A com.)

Dated 20th October, 1863.

2559. J. Taylor, J. Lees and J. Lees, Oldham—Imp. in machinery or apparatus for opening, cleaning, and mixing cotton or other fibrous materials.
2560. E. H. Luebbers, Liverpool—An improved treatment of textile substances to obtain a species of, or substitute for, cotton. (A com.)
2561. W. Ingham, Manchester, and I. Wood, Pendleton, near Manchester—Imp. in the manufacture of copper rollers used for printing calico and other materials.
2563. D. Mills, Birmingham—An imp. or imps. in the manufacture of moulds for casting studs for chains.
2564. J. Vaughan, Birmingham—Imp. in the manufacture of pecks, hoes, adzes, and other edge tools, and in tools to be used in the said manufacture.
2565. J. Michaelis, Tower Royal, Cannon-street West—Imp. in the manufacture of purses, pocket-books, and wallets, and in the construction of double action locks for the same and other similar purposes.
2569. J. Bryant, Edgware-road—Imp. in vent apparatus for facilitating the drawing off or letting off fluids.
2570. H. B. Barlow, Manchester—Imp. in shoes, boots, and other coverings for the feet. (A com.)
2571. W. A. Dixon, Glasgow—Imp. in making aluminate of soda and other aluminous salts.
2572. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in forming stitches over the edges of fabrics, and in machinery connected therewith. (A com.)
2573. J. W. Nottingham, Clayton-place, Kennington-road—Imp. in "Hansom cabs," parts of which imp. are also applicable to other wheeled carriages.
2574. G. H. Daglish and T. Windus, Saint Helens, Lancashire—Imp. in machinery for bending plates for iron ships and other like purposes.
2575. C. Garton, Bristol, and T. Hill, Southampton—Imp. in evaporating, cooling, and melting, and in apparatus employed therein.
2577. T. Restell, Water-lane, Tower-street—An improved construction of walking-stick umbrella.

Dated 21st October, 1863.

2578. W. Hartcliffe, Salford, Lancashire—Certain imp. in mules for spinning and doubling.
2580. J. Hinton, Birmingham—An imp. or imps. in breech-loading fire arms.
2582. N. F. Taylor, 5, Manby-street, Stratford—Imp. in increasing the illuminating power of coal gas, and in the means and apparatus employed therein.
2583. G. Howell, Hawarden Iron Works, near Holywell, Flintshire—Imp. in apparatus for condensing metallic and other fumes.
2588. Z. Colburn, 3, Upper Bedford-place, Russell-square—Imp. in steam engines.
2590. J. Dodd, Oldham—Imp. in mules for spinning and doubling.
2591. W. E. Newton, 66, Chancery-lane—An imp. in sewing machines. (A com.)

PATENTS SEALED.

[*From Gazette, November 3rd*, 1863.]

2nd November.

1053. F. Bennett.
1110. J. Fortune.
1112. B. G. Sloper.
1116. W. Walsh.
1122. P. Bradshaw.
1124. W. Glover.
1127. T. Sagar and J. Wilkinson.
1130. S. Hibbert, J. Lawton, and J. Kay.
1131. S. D. MacKellen.
1132. I. M. Singer.
1135. A. Sturrock.
1138. J. Park.
1143. G. Bower and A. Dick.
1145. J. Bettridge.
1146. C. A. Day, A. Lamb, and T. Summers.
1149. P. J. Livsey.
1151. Henry Schooling.
1153. C. L. Braithwaite and J. Hirst.
1154. J. H. Bailey.
1157. E. Chamonin-Boet.
1158. C. F. Bielefeld.
1160. W. Thomson.
1161. J. Strickland.
1164. J. Norie.
1173. C. H. G. Williams.
1179. C. Shorrock and W. Shorrock.
1187. B. Lilly.
1201. T. Parkinson and F. Taylor.
1206. B. Lambert.
1230. J. Hinks.
1231. R. Talbot.
1234. J. T. Newton.
1267. J. T. Markall.
1296. S. E. Rosser and J. G. Jennings.
1338. George Gore.
1487. I. G. Bass and W. Bass.
1570. S. Robinson, J. Priestley, and J. Foulds.
1724. W. Clarke.
1753. L. M. Bournique and J. B. Vidard.
1754. L. M. Bournique and J. B. Vidard.
2108. T. Westhorp.
2320. W. Elsden.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, November 3rd*, 1863.]

26th October.

2668. D. Joy.
2674. W. E. Newton.
2701. W. Edwards.

28th October.

2640. T. Neal.
2656. J. H. Johnson.

29th October.

2652. J. Beck.
2685. G. Hamilton.
2771. H. E. West.
3067. J. R. Cooper.

30th October.

2718. T. W. Rammell.

31st October.

2690. W. E. Newton.
2717. W. Hewitt.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, November 3rd*, 1863.]

29th October.

2539. T. S. Salt.
2547. J. T. Way.
2741. S. Fox.

30th October.

2577. J. Nasmyth and R. Wilson

Journal of the Society of Arts.

FRIDAY, NOVEMBER 13, 1863.

NOTICE TO MEMBERS.

The One-Hundred-and-Tenth Session of the Society will commence on Wednesday next, the 18th November, at 8 o'clock, when William Hawes, Esq., F.G.S., Chairman of the Council, will deliver the Opening Address. The Chair will be taken at eight o'clock on the following Wednesday evenings:—

1863. November	—	—	18	25	
,, December	2	9	16	—	—
1864. January	—	—	20	27	
,, February............	3	10	17	24	
,, March	2	9	16	—	30
,, April	6	13	20	27	
,, May...................	4	11	18	25	
,, June	—	—	—	29*	

For the Meetings previous to Christmas the following arrangements have been made:—

November 18.—Opening Address by William Hawes, Esq., F.G.S., Chairman of the Council.

*** *On this evening the Prince Consort's Prize, awarded at the last Examination, and the Prizes awarded to the Artist-workmen who were successful competitors at the Wood-carving Exhibition held in June last, will be distributed.*

November 25.—"The Australian Colonies, their Condition, Resources, and Prospects." By Sir Charles Nicholson, Bart.

December 2.—"On Magneto-Electricity, and its Application to Lighthouse Purposes." By F. H. Holmes, Esq.

December 9.—"Agricultural Progress: its Helps and its Hindrances." By J. Chalmers Morton, Esq.

December 16.—"On the Economic Value of Foods, having special reference to the Dietary of the Labouring Classes." By Dr. Edward Smith, F.R.S.

The Council have made arrangements for the delivery of Courses of Lectures (under the title of "the Cantor Lectures") on the following subjects during the ensuing Session:—

Fine Arts Applied to Industry. By W. Burgess, Esq.
Chemistry Applied to the Arts. By Dr. F. Crace Calvert, F.R.S.
International Commerce. By G. W. Hastings, Esq., Barrister-at-Law.

These Lectures will be open to Members and their Friends on the same conditions as the Ordinary Meetings. Particulars of the Courses will be duly announced.

COUNCIL.

The following Institution has been received into Union since the last announcement:—

Mossley (Manchester) Mechanics' Institution.

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

TEA CULTIVATION IN INDIA.

The following report on the working of the government tea factories and plantations for 1862-63 has been rendered by W. Jameson, Esq., surgeon-major, superintendent of botanical gardens, North-Western Provinces, and is published by order of the government of the North-Western Provinces:—

I have the honour to lay before you, for the information of his Honour the Lieutenant-Governor, the following details, showing the manner in which the tea factories and plantations in the North-Western Provinces have been worked during the last season, or from April, 1862, to April, 1863.

During this time the quantity of tea prepared in the factories was:—Kowlaghir factory in the Dehra Dhoon, 18,915lbs. 12oz.; Hamul Bagh factory in Kumaon, 6,241lbs. 8oz.; Ayar Toli factory in Kumaon, 8,475lbs. 8oz.; Bheem Tal factory in Kumaon, 225lbs.; total, 35,833lbs. 12oz. To this add the yield of the Kangra plantations, 16,125lbs., and we have thus an out-turn of 52,008lbs. 12oz.

During the season the government plantation at Paoree in Gurhwal has been sold for rupees 100,000 (one lac of rupees).

In addition to the tea produced, an enormous quantity of seeds has also been yielded, thus:—Dehra Doon plantations, mds. 1,307; Hamul Bagh ditto, mds. 973, seers 39; Bheem Tal ditto, mds. 135; Ayar Toli ditto, mds. 446, seers 33; add—yield of Kangra plantations, mds. 1,151; total, mds. 4,010, seers 32; or the enormous quantity of 148 tons 2 cwts. 10lb.

Financially the result of the working of the tea plantations of the North Western Provinces may be thus considered:

	Rs.	As.	P.
To 35,883, 12lbs., at rupees 1.8 per lb. ...	53,125	10	0
To 2,859 maunds of seeds, at rupees 20 per maund	5,178	0	0
Total	111,005	10	0
To expense of working the plantations ...	65,000	0	0
Balance	65,000	0	0
To this must be added the value of the plants distributed gratis to private planters, viz., 700,000, at rupees 3 per 100.	21,000	0	0
Total balance............	67,005	10	0

All the plantations show an increase on the out-turn of last year, that of the Dehra plantations being 3,933 lbs. 4 ozs.; of the Hamul Bagh and Ayar Toli plantations, 689 lbs. 10 ozs.; and of the Bheem Tal plantation, 985 lbs. 9 ozs. Total, 5,608 lbs. 7 ozs.

The demand for tea is greatly on the increase, and the prices realised at the auctions were fair average ones.

To the commissariat 3,756 lbs. of green tea were made over to the Assistant-Commissary-General, Umballah. By natives the demand is considerable, and by one party—a Cashmere, by name Gholam Ghose—1,300lb. were purchased to forward to Bochharah.

To the plantations themselves considerable additions have been made, particularly to those of Ayar Toli, where upwards of two hundred acres of waste land have been broken up and planted. All the remaining waste land, too, at Hamul Bagh has also been planted, and at Bheem Tal a large tract of jungle has been cut down, cleared, and planted.

To private planters, great assistance in the form of seeds and plants has been rendered, and during the season the enormous quantity of 2,066 maunds, or 77 tons, and 700,000 seedlings, have already been distributed gratis from the plantations, North Western Provinces, to applicants. But this enormous quantity was very far short of the demand.

11. To the Madras government, at the request of Dr. Cleghorn, 24 large packages of tea seeds were forwarded to the secretary to the revenue board Madras, which by him have been sent to the collectors of Salim, Madura, Tinnivelly, Coimbator, Malabar, and Coorg, for distribution to planters.

In the cultivation a large amount of capital is now nvested, and annually large tracts of jungle land are being broken up and planted with tea; and such is the demand for seeds that prices demanded by private planters who have plantations, varying from rupees 20 to rupees 50 per maund, were readily given for them, and by a sale of seeds to private planters, portion of the produce of the government plantations in the Kangra Valley, the large sum of rupees 14,060 was realised. This sale, however, was cancelled by his honour the Lieutenant-Governor of the Punjab, it having been shown that private planters were guaranteed the distribution of seeds and plants gratis, so long as the government plantations were kept up. At Darjeeling seeds were selling at the rate of rupees 120 and rupees 130 per maund; and in Assam at rupees 250. This, therefore, shows their value, and the value of the aid yielded by the government plantations to private planters in their gratis distribution.

To many planters, both European and native, experienced tea cultivators and tea manipulators have been given, and in every tea factory, from Kumaon to Kangra, men educated in the government factories are to be found. In every plantation, too, formed by private parties, their head native workmen or Chowdries are found to be men brought up in the government plantations. But to give this kind of aid, and at the same time to distribute seeds and plants largely, and thus encourage and rapidly extend tea cultivation in the Kohistan and Dhoons, are the chief purposes for which the government plantations are now maintained, and this, I trust, has been done in a most efficient and effectual manner.

To Madras, on the requisition of the Madras government, four experienced native teamakers have been forwarded from the factory in the Dehra Dhoon to teach the natives in that presidency how to manipulate tea.

To show the extent of the move connected with tea cultivation in the Kohistan of the north-western provinces, we shall briefly mention the plantations now in working order, a map of which has been prepared in the office of the Surveyor-General of India Colonel Thuillier, by orders of his honour the late Lieutenant Governor.

In Eastern Kumaon, at Petoraghur and Lohoogat, Messrs. Lyall and Company and Messrs. Dansey have formed plantations, and are carrying on their work with vigour and energy. These plantations near the Kali River, which separates the British territory from Nepal Proper, are the more eastern ones in the Kohistan of the north-western provinces. Proceeding to the eastward, *via* the military road leading to Almorah, we come to the plantations of Messrs. Wheeler at Culnah, consisting of 300 acres, of which upwards of 100 have been planted.

In the immediate neighbourhood of Almorah we met with numbers of small but fine plantations belonging to different parties, two of them to government, and the first established nurseries in the province, and from which all the plantations in the Kohistan have taken their rise.

Proceeding north to Hamul Bagh we find on all sides tea plantations, the largest belonging to government. Here, too, we find a magnificent plantation, yielding large quantities of tea, established by the commissioner. Colonel Ramsay. The plantation, formed chiefly by prison labour, shows how easily the work can be carried on, provided that it receives the necessary attention.

Here, too, we find plantations of chullar, &c., belonging to government, with its factory, godowns, &c., on a complete and efficient establishment. Surrounding the factory there are plantations of upwards of a hundred acres covered with fine luxuriant tea bushes.

Proceeding due south from Almorah and thirty miles distant, we come to the government plantation of Bheem Tal, where the tea plant is growing most luxuriantly. To this plantation great additions have lately been made, which will cause the out-turn this season to be treble that of former years.

From Hamul Bagh, 25 miles north, we meet the great plantation belonging to the Kosaine Tea Company, which is being vigorously carried on, and by them large quantities of tea are prepared. Descending the ghaut at Kosaine, we enter the Bijnath Valley, and on all sides meet with flourishing tea plantations. This valley is destined to become one of the great centres of tea cultivation in the Himalayas. In it there is the great government plantations of Ayar Toli, and adjoining the plantations of the Bijnath Tea Company, and those of several other parties.

Crossing the range of mountains which separates Kumaon from Gurwhal, we come to the flourishing plantation of Messrs. Warrand, at Gauldun, which is progressing most favourably. Twenty-five miles north-west from Hamul Bagh we meet with the plantation of Colonel Money, at Donagiree, and at Lohah the plantations of Messrs. Richards, and adjoining those of Messrs. Barstow and Company at Silkote.

At the head quarters of the Senior-Assistant of Gurhwal, viz., Paoree, we find the fine plantation of Chopea, which was lately sold to Mr. Henry for 100,000 rupees.

As a great centre for tea cultivation, Paoree is admirably suited, commanding, as it does, good roads to the plains *via* Tuppubund and Hurdwar, and *via* Kotdwarrah and Najeebabad.

Leaving the Kohistan and proceeding to the Dehra Dhoon, everywhere we find the plant under cultivation, at least in localities where man can live. Many other localities there are in this magnificent valley fitted for this kind of cultivation, which, however, owing to its unhealthiness from the want of drainage, as in the Eastern Dhoon, or the entire want of water, as in the upper part of the Western Dhoon, cannot be inhabited. But by the tea plant the Dehra Dhoon, which has remained, I may almost say, stationary for the last forty years, no successful attempt having been made to clear its vast waste jungles, is now being regenerated, and a vast stimulus given to farming; and in a few years, if the active and energetic measures now being adopted to bring the valley under cultivation with tea be continued, this magnificent, and until lately neglected, spot will become one of the most important districts of the North-Western Provinces.

The same remark, too, applies to the Kohistan of the North-Western Provinces, which in 1814 was considered by government as so unprofitable as to be unworthy of retention. Heirs, therefore, to hill lands which had by right of conquest become the possession of government were hunted out, and all parties who had been driven from their possessions in Kohistan by the Goorkhas, in 1803, were invited to return and reclaim what belonged to them, though they had not in any way assisted in expelling the invader.

A third of these lands are fitted for tea cultivation, and if so cultivated would not only supply the whole of the Indian markets with tea, but that of Europe also.

In a former communication I estimated the quantity of waste and other lands fitted for cultivation with tea throughout the Kohistan of the north-western provinces and Punjab and Dhoons, and showed that by them the enormous quantity of 885,000,000 lbs. might be there raised. But in this estimate I excluded the Kohistan of Huzarah and Rawul Pindee, of Cashmere, Jummoo, and the protected Seikh states. The following estimate of the yield of the British territory is more nearly the mark, and as a general return when in full bearing 100 lbs. per acre may be given:—

	Acres.	100 lbs. per Acre.
Kohistan of Rawul Pindoo and Huzarah	20,000	2,000,000
Kangra Valley	35,000	3,500,000
Kasloo	35,000	3 500,000
Mundee, &c.	40,000	4,000,000
Protected Hill States	10,000	1,000,000
Jonsar Bawer	10,000	1,000,000
Dehra Dhoon	10,0000	10,000,000
Western Gurhwal	180,000	18,000,000
Kumahon	350,000,000	350,000,000
		930,000,030

a quantity equal to the whole export trade of China, and with high cultivation the figures might easily be doubled, and thus not only allow an immense quantity for the consumption of the Indian community, but at the same time afford a vast supply for export to other countries.

In February last, at the request of the Lieutenant-Governor of the Punjab, I proceeded to the Kohistan of the Rawul Pindee districts and Huzarah, there to establish the tea plant, which has been most successfully done, the plants removed from the Kangra plantations and transplanted at Seehlah now growing with vigour.

We have thus now the tea plant thriving over 4 degs. 3 mins. of latitude, and 6 degs. of longitude, or from Kali River in the east to Huzarah in the west, and from Dehra Dhoon in the south to Ramaserai in West Gurhwal in the north, or over a tract containing upwards of 35,000 square miles. In this mighty tract, the whole of which might have been the property of government had it not alienated away its just rights to others from a mistaken idea that its retention would be unproductive and unprofitable, there is a sufficient quantity of land fitted for tea cultivation, which, if so used, would produce teas capable of supplying the whole world.

The crops generally grown in the hills yield but a small return to the cultivators, and thus they are obliged to look to other sources than the sale of the produce of their lands to procure means to pay their revenues. The Kumaon and Gurhwal provinces, covering a tract of upwards of 19,000 square miles, yield little more than two lacs of rupees annually to the state, showing the poverty of the country. Tea, on the other hand, is a highly remunerative crop, and occupies the time and attention of millions of beings in the adjoining kingdom of China, and is the means of yielding a large revenue to the state. India possesses within itself capabilities equally advantageous for the cultivation in having abundance of land fitted for the purpose, unlimited and cheap labour, great rivers, and ere long an iron road for transmitting the produce to good and available markes; and last, not least, a climate equally well adapted for the growth of the plant, as has been proved by the government plantations scattered over the country.

By the press it has been stated that the land fitted for tea cultivation was limited and labour scanty. But both are great errors; land in the vast forest tracts abounds admirably fitted for the tea plant, and when brought under cultivation wi h tea, which is gradually being done, and which the fine plantations at Ayar Toli, Paoree, &c., have proved to be so well adapted for the purpose. Tea on them could be raised to a vast amount, and form a mighty export trade. In many districts, too, in the hills, admirably fitted for tea, now covered with dense and impenetrable forests, as in Kuttyoor and Gungoli there are no roads, or roads wholly unfitted for beasts of burden; nor can good roads be expected until the country yields a produce sufficiently valuable to pay the expenses of opening it up, and at the same time offer to government some return for the labour and money which would require to be spent. Were tea, therefore, generally introduced, a produce would be forthcoming which would yield the requisite means to open up these hitherto neglected mountainous regions.

In six or eight years the Dehra Dhoon, particularly the western portion, will present one sheet of tea cultivation. There we have the following parties actively and energetically carrying on the work:—Close to the Jumna we find the luxuriant plantations of Messrs. Rind and Co., Messrs. M'Pherson and Co., and the Western Hopetown Tea Company. Here, too, there are some fine plantations cultivated by natives, as Heera Lal, &c. Further to the eastward we come to the fine tea plantations of the Dehra Dhoon Tea Company, with a capital of 20 lacs of rupees, by whom tea is now being manufactured in large quantity, the fine plantations of Messrs. Dick, Messrs. Barlow and Co., Messrs. Forrest and Co., Messrs. Batt, Messrs. Swetenham, Messrs. Richards, &c.

By wealthy and intelligent natives many fine plantations have also here been formed, the most important being those of Lullah Ram Nauth and Nund Lall, at Hurbujwallah; Dhoom Singh, at Gurree; Kuniah Lall and Thakoor Dass, at Neerunjunpore; Rajah Lall Singh, at Nuthunpore; and Mahuat Preetram Doss, at Umbawallah.

In the centre of the valley at Kowlaghir is the great government plantation, from which has sprung all the plantations around.

The move, therefore, is now a gigantic one, and I have attempted to show approximately the quantity of land being brought under cultivation, and the men and capital thus employed. But it is a mere approximation, as monthly new parties are entering on this now highly popular field of enterprise.

To the westward of Kohistan of the Punjab, and Kangra Valley, &c., an enormous amount of capital is also being invested in the undertaking, and the valley and hill sides are rapidly being covered with tea plants, and that, too, in a country where ten years ago the tea plant was unknown.

The work there done will form the subject of a report to the Punjab government.

But it is no longer an experimental tea cultivation in the North-Western Provinces, it having passed from experiment to fact. It having been proved by data which cannot be gainsaid, that the cultivation of the tea can be profitably conducted; that the tea prepared is admirably fitted for the home and colonial markets; and that, if properly conducted and backed by capital, the undertaking presents a safe and profitable investment.

This having been fully proved, and the field occupied by an immense amount of capital, the time, in my humble opinion, has come for government to retire from the field, and allow it to be occupied unfettered by the private capitalist.

Already many estates raised entirely from plants and seeds supplied gratis from the government plantations have changed hands for large sums of money, as the Hurbunswallah estate in the Dehra Dhoon for £50,000, &c., and several others also raised from seeds and plants distributed gratis from the government plantations.

By many private planters seeds and seedlings are now offered in any quantity and number for sale. This, therefore, shows that the field is fairly occupied, and that aid from government is no longer required to induce parties to go on with the cultivation.

The move is already a national one, and the part which was necessary for a great liberal, and powerful government to play is completed.

Parties with the limited capital of a few thousands of rupees are now rushing into the field to take up waste land and form plantations from the seeds and plants given gratis from the government plantations; such individuals are rushing on their ruin, and must break down, or they must sell the plantations thus formed, unless supported by capital. To form a plantation is an easy affair; but to work that plantation, prepare and pack teas fitted for the market, and to forward such teas to distant and available markets, is not to be done without money; and tea cultivation to be highly remunerative must be conducted

on a large scale. The local markets open at present for the produce of the factories now in operation will soon be glutted, and thus cause the growers to seek markets for produce in those of Europe, America, or Australia. But these markets cannot be reached without capital. For parties, therefore, with only a few thousands of rupees to attempt to embark successfully in tea speculation is, in my humble opinion, a mistake, and to these men the gratis distribution of seeds and plants, and the easy terms on which waste lands can be obtained in the Kohistan, are the primary inducements. But, as stated above, government have fully played out their part, and the support so generously tendered for many years to private parties is now no longer required.

For government to part with their tea plantations the time, therefore, has come. I would, therefore, respectfully venture to suggest at the end of the present season that the tea plantations of Kumaon and the Dehra Dhoon be sold, in fee simple, to the highest bidder; that the sale be advertised in the Indian and home papers, and that in March, 1864, the highest tender above the upset price be accepted. This would give ample time to advertise the sale in the Indian and home papers, and at the same time the produce of the season will then be all finished, sifted, and packed, and thus ready for removal.

I would further recommend that the plantations be sold in three lots:—1st. The plantations in Hamul Bagh, at or near Almorah, and at Ayar Toli, in Kuttypoor, with their dwelling-houses, factories, stock and block, and everything complete for preparing and packing teas, be offered for sale at an upset price of two lacs of rupees. 2nd. That the plantation at Bheem Tal in Kumaon, with its factory, stock and block, and everthing complete for preparing and packing tea, be offered for sale at an upset price of 20,000 rupees. 3rd. That the plantations at Kowlaghir in the Dehra Doon, with the factory, &c., and stock and block, and everthing complete for preparing and packing tea, be offered for sale, in fee simple, at an upset price of two lacs, £20,000.

In the home markets, teas the produce of the government factories in the North-west Provinces and Punjaub are well known, but seldom seen. The sample about to be transmitted, consisting of 300 40lbs. chests, will show to London capitalists the kinds of tea capable of being produced, and will thus assist, along with the advertisements, to attract attention to the plantations which are shortly to be thrown into the market. A detailed list will be prepared showing the kinds of teas packed and forwarded to her Majesty's Secretary of State for India.

AMERICAN WATCH TRADE.

The manufacture of American watches, commenced within the last ten years in Boston as an experiment, has proved eminently successful. Unable heretofore to compete with the low priced labour of European workmen, they perfected machinery by the aid of which watch movements are fabricated equal to the hand-made. The continued growth of this branch will diminish the importation of foreign watches, and may at no distant period earn for North America a reputation in this manufacture equal to that she enjoys in the kindred branches of clock-making. Gold and silver watch cases are now produced to a very large extent, chiefly in the cities of Philadelphia, New York, and Newark.

WEST RIDING (YORKSHIRE) EDUCATIONAL BOARD.

On Wednesday evening, the 4th instant, the Victoria Hall, Leeds, was filled by a large assembly of those interested in the presentation of prizes and certificates to the successful candidates at the Examinations of the Society of Arts, the Oxford University, and other examinations conducted by the West Riding Educational Board, and of the medals and prizes gained by the pupils of the Leeds School of Art. The Archbishop of YORK was the chairman upon the occasion, and he was supported on the platform by Mr. F. S. Powell, M.P., the Mayor of Leeds, the Vicar of Leeds (Rev. Canon Atlay, D.D.), the Mayor of Bradford, and others.

Mr. BARNETT BLAKE read the annual report, which stated that a large increase had taken place in the business of examinations, and showed the importance of the principle of examination as a test of the results of instruction. After hinting at the necessity for a systematic organisation in order to conduct these examinations, the report claimed credit for the West Riding Board having satisfactorily performed its duties, as shown by the gratifying result of its labours, and stated the pleasing fact that Leeds is the only place in which the examinations of the three universities—Oxford, Cambridge, and Durham—have been held.

The Archbishop of YORK said he had been invited there no doubt as Archbishop of York to have the pleasure of presenting the prizes to the candidates on this occasion, but it was not as Archbishop of York that he wished to present himself, but as a veteran examiner connected with those very institutions about which the report had then treated—for he was for two or three years examiner in theology to the Oxford University Local Examination Board; and, more than that, he believed he was the first bishop who ever acted as examiner to the Society of Arts in London, and that he continued to do until the present year, his subject being logic. When the University local examinations were first instituted, he took great pains to get the university to place divinity on a level with other subjects in the examinations, and in that he had succeeded. There was still in the minds of some people a kind of fear of examinations. That fear he could not share; for it seemed to him most obvious that when a person has been teaching and another taught, both should have their teaching and their reception of knowledge fairly tested by some person competent to form an opinion between the two. At the first examination at Oxford, several schools sent up boys for competition, and every boy was rejected, and rejected from a want of knowledge of the most elementary subjects, a knowledge of reading, writing, arithmetic, and the rudiments of geography. Was it wrong, as regards the interest of the educator, to expose thoroughly the mistaken track which he was following? On the contrary, nothing could be kinder; and doubtless the teachers, possessing probably great merit, but not having the particular merit of being able to judge of their own handiwork, took the hint, and mended their ways, and cut a fair figure in future examinations. The number of failures among the candidates was a further evidence of the advantage of examinations; but how much good was also done by success? He had himself, as head of a college in Oxford, seen men come to the university to be matriculated there, and they had told him that their reason for coming there was, that they had obtained a first-class in the Local Examinations, and so their friends told them it was worth their while to train for a learned profession, and their course of life had been changed accordingly. Looking to the benefits of Examinations, he thought it a matter of wonder in some respects that the number of candidates which these Examinations drew forth was not even much greater. Every school or other educational establishment should be under some sort of inspection or other. He could not but feel a great interest in those—and they were many—who are labouring to cultivate themselves by means of the Examinations of the Society of Arts and other similar methods. He could not help saying a word now to those persons who are so striving to improve the little leisure they have, and to make profit of it by the increase of their knowledge. He was quite sure that if he were to appeal now to the self-interest of such persons they would tell him honestly that it is not mere self-interest that makes them spend their scanty leisure over books, and their

scanty funds upon the purchase of books. Leeds was a place that understood pretty well the utility of different institutions; but he was sure, also, it was not mere considerations of utility that made the students who are found in Leeds. It was something far better. It was the love of knowledge for its own sake, as a gift of the Almighty, and on account of its intrinsic dignity and worth. Many of the papers in divinity which he had read from boys of sixteen, seventeen, and eighteen, would have done credit to any undergraduate of the University who had spent his whole time in the most careful education—even to a candidate for holy orders. He had also examined papers in logic, a subject that he paid some little attention to—not a few of them were remarkably good, some well expressed, the subject thoroughly well read and mastered, and having seen a good deal of University logic, he was enabled to say that those papers would have done credit to any University examination—even to the most promising candidates there. They should take courage, therefore, and feel that there is no barrier that they may not overcome, and that they have within them the power and means of cultivation in several most important branches of study. He would specially urge upon them not to neglect the forming of a good style in composition. Instead of thinking only of the facts to be acquired, let them think a good deal also of that language which is the means of intercommunion, and take care that the language in which they dress their thoughts is always good and suitable to the subject. One of the principal intellectual dangers of the present day was superficiality of mind. Now, in order to avoid that superficiality, it was well to have our one subject on which to concentrate our minds. In conclusion, the Archbishop said:—"I am convinced that knowledge need not be feared. I am convinced, speaking as a minister of religion, that it is better for me to deal with the man who is educated—I speak not now of religious education only—it is better for me to speak to the cultivated than the uncultivated man. I am afraid that those dreams of Arcadian simplicity—that the notion that the country with ignorance is very pure, and the town with its accomplishments and acuteness is very demoralised—I am afraid on inspection those visions of simplicity vanish away; and I am afraid it would be found that vices prevail in those remoter and less enlightened regions which in the town are never heard of at all. I sympathise thoroughly with all those who wish to know the mind that God has given to them, to know the world that God has created, to know the various tongues in which other men express themselves. All that need not be good, but at all events it may become the great instrument of good; and I would rather deal with the man of cultivation than with the man who had received no instruction at all, because at least with the one I can find the way into his mind, and wrestle with him on very fair terms; but as to the man who has no education, the difficulty is to find words to talk with him at all. I find in the pages of the Old Testament that wisdom and knowledge are always spoken of as divine gifts—something worthy of honour—and I do not find anything to the contrary in the New Testament. In the New Testament there are certainly some cautions against knowledge, but it was Pagan knowledge, then sullied with all sorts of impurity; and the Pharisaic knowledge hardened against the Lord and against truth. This kind of knowledge is condemned in the New Testament, because it was not worthy of the name. It was only half knowledge. But the true knowledge is that which does not puff up—the true knowledge is that which, when it looks upon the world around it, sees the very littleness of all its own efforts and the impossibility of covering the wide field before it. Does that leave any room for pride and self-conceit? To the man who has acquired a little knowledge, and become vain and conceited, I would administer the homœopathic treatment of a little knowledge more. And why? Because, in fact, no man can really look upon the field of knowledge without perceiving how infinitely vast it is; and when we see it is no longer possible for even the greatest amongst us to become a kind of walking cyclopædia, or to be even as great in mind as a Bacon or a Leibnitz—when we see that science is so extended and ramified that we must be content with only a little, and that possibly only one science is too much for one man's life to master then I think we are very near this further lesson, if knowledge cannot all be conquered, what is there we can thoroughly conquer and subdue? Can we not turn within ourselves, and say that, although I find, after all, I am but as the child which picks up shells on the shores of the great and unfathomable sea, still I may take a lesson from that, and say that the object of learning is not that I should conquer everything—because that cannot be—but it is that I may do my duty here as a unit in the great population which God has poured over the world—that if my knowledge cannot be perfect, the sense of duty with which I am penetrated, and the sense of love towards my kind which fills me, may at least be perfect and complete, for these are mine to cultivate. Such are the reflections which arise naturally in my mind on such an occasion as this, and I heartily wish God speed to this institution."

The Archbishop then distributed the prizes and certificates, a list of which, so far as the Society of Arts is concerned, has already appeared in this *Journal.*

The Rev. Dr. Atlay then moved a resolution, to the effect that the meeting recognised the valuable services of the West Riding Educational Board, and considered it amply entitled to the liberal support of the public, so that it may be enabled to continue and increase its operations. He felt that if education was worth anything it was only to be tested by its results; and he was glad of the opportunity of saying that he for one was not in the least afraid of so testing the education given in our national schools. He had gathered from his Grace's observations an allusion to the well-known system called cramming, which generally was much depreciated, but he (Dr. Atlay) felt that it was run down much more than it ought to be. A little knowledge was better than none. Such preparation might be gained in an hour, and lost in an hour, but after all there was a considerable residuum in the mind. After some observations on the comparative merits of style and sense, the rev. gentleman concluded with an appeal for better pecuniary support to the West Riding Educational Board, the importance of whose operations but few persons in the West Riding seemed sensible of, if they might be judged by the absence of their names from the subscription list.

Mr. F. S. Powell, M.P., seconded the resolution, saying that he rejoiced in the circumstance of the Archbishop of York being present, because it was one of the many proofs, so full of encouragement and so pregnant with hope, to members of the English Church at this time. It supported them in the belief and full confidence which they entertained that the Church of England was not antagonistic to the progress of the instruction of the people—not antagonistic to the cultivation of the mind of England, but, on the contrary, was one of the foremost of the great educational army—was itself in the very van of the attack against the darkness of ignorance and prejudice. The presence of his grace in the chair that night showed that religion had nothing to fear from the promotion of science, but showed, on the other hand, that there was a complete union and an entire fellowship between science, when rightly cultivated, and the religious element, when properly developed. After reviewing the collegiate and national systems of education, the hon. gentleman said this educational board supplied the interval between the two. It completed the whole system, and he was convinced if this and kindred associations could be fairly developed, and could obtain the sympathy of the public mind, England would be covered with one tide of knowledge, a calm, genial, and fertilising stream.

The proposition having been put and carried, Mr. J. H. Shaw moved—

"That in promoting the cultivation of the mental powers, of a correct taste in art, and a capability of appreciating the true and the beautiful, amongst all classes of the community, the Leeds School of Art has been eminently successful, and is deserving of continued and increased support."

The Rev. E. Monro seconded the proposition, and it was carried.

Mr. Kitson moved—

"That the value of the educational operations of the Leeds Mechanics' Institution has been fully proved by the success of its members in the several examinations by which their attainments has been tested; and as its means of usefulness are limited by insufficient accommodation, the liberality of the public is appealed to in behalf of the fund for the erection of a more commodious building."

The Rev. J. T. B. Landon, one of the local examiners, seconded the proposition, which was carried.

Mr. W. B. Denison moved, and the Mayor of Bradford seconded, a vote of thanks to the Archbishop for presiding. The Mayor of Leeds put the motion to the vote, and it was carried enthusiastically.

His Grace having shortly acknowledged the compliment,

Canon Atlay explained to the meeting before parting how indebted they were to the rev. gentlemen who conducted the elementary and preliminary examinations. Were it not for those gentlemen's services, it would be impossible for the Educational Board to carry on. To them, therefore, an enormous debt of gratitude was owing for the pains they had taken in sifting, and reading, and searching through the various papers submitted to their perusal.

Proceedings of Institutions.

Bristol Athenæum.—On Wednesday, 28th October, a meeting was held at the Athenæum for the purpose of distributing the prizes and certificates awarded by the Society of Arts to candidates at the examination of 1863 in the Bristol district. The chair was taken by the Rev. Canon Girdlestone, and amongst those on the platform were the Rev. C. Brittan, Messrs. H. Brittan, Dunlop, Fear, Hazeldine, &c. The secretary read the report, which, after referring to the early establishment of the Society's system of examination, goes on to say that in every particular the scheme fulfilled its promises—the tests were rigidly impartial and searching without exacting too much, the attestations unquestionably authoritative, the rewards and encouragements ample and substantial, the success complete. Though the number of candidates at Bristol had been small, their proficiency in their several subjects and consequent successes were considerably above the average of the kingdom. 1859 was marked by an event honourable alike to this city and to the Society of Arts, and in relation to which the Board feels it has some cause for self-gratulation. It was the admission of ladies as competitors for these intellectual distinctions, on equal terms with male students. A few members of the Athenæum ladies' classes having expressed a willingness to submit their attainments to the test of examination, their claims to admission were urged upon the Council by the Bristol Local Board, and in that year four young Bristol ladies won the first unrestricted public educational honours ever awarded to their sex in this country. The example, so bravely and worthily set, was quickly followed in other towns; every annual return shows an increase in their number, whilst last year the highest prize in English literature was won by a girl of eighteen; and this year the second prize in French carried off by another fair candidate only a few years older. Modern languages and literature have been naturally by them the subjects most frequently chosen. Among the young men a very noteworthy change has taken place; while the number of candidates in Latin and Roman history has declined from seven and a half to one and a quarter per cent., and in conic sections from seven out of a hundred candidates to less than one in six hundred, the candidates in arithmetic and book-keeping have risen from twenty-four to forty-two per cent. Bristol has participated with the rest of the kingdom in this transition from the less to the more practically useful branches of education, but unfortunately not in the general augmentation in the number of competitors. The list for the present year comprises only ten names, among whom one prize and eleven certificates have to be distributed. This paucity of numbers is probably attributable rather to want of information regarding these examinations than to disregard of the advantages they offer. The possession of fair abilities, generally well cultivated, and of special intimacy with some one or more of the principal departments of knowledge, is, beyond doubt, the best capital with which to begin a life of self-support, and, coupled with moral integrity, the best recommendation to respectable and remunerative employment. A certificate, therefore, from indisputable authority, that a full, impartial, and searching examination has proved the possession of these qualifications is not only a proud and honourable distinction, but an invaluable starting ground, and a constant help in the struggle for advancement.—The Chairman said it had fallen to him, as chairman of the Local Board of Bristol connected with the Society of Arts, to undertake the pleasing office of distributing the prizes which had been awarded to the successful candidates in that city, and in making a few remarks on the subjects connected with the education for which they had met together that evening, he did not think he could take a better text than the word "Capital." He thought he should be only asserting that which was thoroughly true, when, referring to the able report which had just been read, he set before them this conclusion—that those prizes and certificates of merit awarded by the Society of Arts, were in themselves "capital" to those who were fortunate enough to have them awarded to them; and more than that, the education which must be attained before those prizes and certificates of merit could be won—that education was in itself a most valuable kind of property also. He would say, in the first place, that those certificates—leaving the money prizes out of the question altogether—were capital to every person to whom awarded; and for this reason:—he did not think that a more impartial and searching examination could be carried out than that of the Society of Arts. The arrangements were such that there could not be a chance of partiality in the awards made. That being the case, the certificate of merit was undoubtedly an impartial one, given after a searching examination, and impartially adjudicated. Those certificates of merit were capital to every one who held them, because they were passports to situations of trust, and honour, and profit, which could not otherwise be obtained. But much more than that was the education which led to the possession of those certificates of merit, capital. He did not care what position in life a person occupied—education was capital. In every position of life those who climbed to the top of the tree were those who had received the best education, and therefore education was capital; capital, he meant, in the sense of profit. But there was another higher, intellectual sense in which it was capital—namely, in the great personal enjoyment it conferred upon the individuals themselves. He was quite sure there was no educated man in that room who would not agree with him in saying that there was no enjoyment equal to intellectual enjoyment. The power of reading and understanding the valuable works which now issued in such numbers from the press on every sort of subject—the power, he said, of reading and understanding those works was a power which bestowed upon those who possessed it a large amount of real enjoyment, such as could not be obtained from any other source. But although he felt that his own success in life was a very profitable result of education, yet he had no hesitation in avowing that all those advantages were

not for one moment to be compared with the personal enjoyments he every day derived from the education which was bestowed upon him. With those feelings, they would not be surprised that he had always taken a deep, anxious, and personal interest in everything that was connected with the education of this country; he could not but feel an earnest wish that the advantages which the Society of Arts held out for the promotion of education, and the attainment of an advanced state in the different branches of knowledge, might be better appreciated than ever. They never could forget the remarkably encouraging fact referred to in the report, that it was Bristol which first pleaded — successfully pleaded—for those honours being conferred upon the ladies as well as the sterner sex. He was glad to think that the ladies had availed themselves of those advantages, and in some cases carried away valuable distinctions. —The prizes and certificates were then distributed by the chairman. Mr. H. BRITTAIN moved, "That the system of examination which has been originated and fostered by the Society of Arts, is well calculated to foster the progress of education, and reward efforts for self-improvement, and is therefore entitled to hearty co-operation and support." The motion was seconded by Mr. F. HAZELDINE, B.A., and carried unanimously. Signor DAMIANI moved a vote of thanks to the Local Board of Examiners, and to the Directors of the Athenæum. The Rev. C. EVANSON seconded the motion, which was also carried *nem. con.* Mr. M. WHITWILL, on behalf of the Directors of the Athenæum, acknowledged the compliment. A vote of thanks to the chairman was then passed and acknowledged.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Medical, 8½. Clinical Discussion. 1. The President, "Cases of large Tumours of the Scalp removed by operation. A Case of Fibrous Tumour of the Uterus." 2. Dr. Routh, "On a Case of Hydrocepalus of several years' standing." 3. Dr. Gibb, (1). "Removal of a Pin from the Larynx." (2). "Removal of the Bristle of a Tooth brush from the Tonsil." (3.) "United Fracture of the Ponum Adami in a Phthisical Boy.". 4. Mr. Hart, "Ophthalmic Disease." 5. Dr. B. W. Richardson, "On Iodine as a Disinfectant."
British Architects, 8.

TUES. ...Statistical, 8. Mr. Chapman, "On the Industrial Progress of Victoria, as connected with its Gold Mining."
Civil Engineers, 8. 1. Discussion on "Red Sea Lighthouses." 2. Mr. W. Morshead, jun., "On the Duty of the Cornish Pumping Engines."

WED. ...Society of Arts, 8. Opening Address by Mr. William Hawes, F.G.S., Chairman of Council.
Meteorological, 7.
Geological, 8.

THUR. ...Chemical, 8. 1. Mr. Riley, "Vanadium in English Pig Iron." 2. Dr. D. Price, "Quantitative Determination of Sulphur." 3. Drs. Frankland and Duppa, "Mercuric Organic Radicles." 4. Dr. Phipson. "Sulphuretted Hydrogen Apparatus." 5. Mr. Scharlemmer, "Ethyl-Amyl Radicles."
Linnæan, 8.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, November 6th*, 1863.]

Dated 8th July, 1863.

1698. T. Preece, Leominster—An improved corn and seed drill.

Dated 4th August, 1863.

1918. C. Gouty, La Tour, near Bédarieux, France—Imp. in fulling, thickening, felting, and cleansing cloths, and in the apparatus connected therewith.

Dated 6th October, 1863.

2444. R. A. Brooman, 166, Fleet-street—Imp. in steam boilers and furnaces. (A com.)

Dated 7th October, 1863.

2448. E. Jones, Gorton, near Manchester—Imp. in apparatus to be used for pumping water out of mines and other places.

Dated 10th October, 1863.

2489. D. Proudfoot, Glasgow—Imp. in printing or dyeing textile fabrics.
2490. J. W. Goundry, Old Shildon, near Darlington, Durham—Imp. in musical instruments.

Dated 16th October, 1863.

2532. E. Rowing, Norwich—Imp. in steam engines and boilers.
2535. F. G. Stuber, 20, Waterloo-road, Lambeth—Imp. in lamps and stoves for the application of blast heat to horticultural, agricultural, and other specified purposes.

Dated 17th October, 1863.

2549. E. H. C. Monckton, Cavendish Club, Regent-street—Imp. in the means of uniting or joining plates or sheets of metal, which invention is applicable to the construction of boilers, tubes, and other useful purposes.

Dated 19th October, 1863.

2553. H. Gilbee, 4, South-street, Finsbury—An improved composition for rendering boots and shoes and other similar articles waterproof. (A com.)
2556. J. Whitley, Leeds—Imp. in the permanent way of railways.

Dated 20th October, 1863.

2562. C. T. Morley, Constitution-hill, Birmingham—Causing a more complete combustion of gas in using it for lighting purposes.
2567. H. Hennessy, Wynnefield, Charleville-road, Dublin—An imp. in projectiles.

Dated 21st October, 1863.

2581. C. Schiele, Clarence-buildings, Manchester—Imp. in governors.
2584. T. Hodson, W. Nightingale, and R. Laird, Preston—Imp. in machinery for carding cotton and other fibrous materials.
2587. R. A. Brooman, 166, Fleet-street—Imp. in treating ligneous substances in separating and recovering the fibrous portions therefrom, in preparing, bleaching, and sizing the same, and in machinery employed therein. (A com.)

Dated 22nd October, 1863.

2592. G. Cutler, jun., 8, Wharf, Wenlock-road, City-road—Imp. in boilers, and apparatus used for the generation of steam.
2593. R. Bailie, London-yard, Isle of Dogs, Middlesex—Imp. in the construction of floating docks.
2594. H. Wilson, Stockton-upon-Tees, Durham—An improved lubricator for steam engines.
2596. A. A. Croll, Coleman-street—Imp. in the preparation of matters to be employed as disinfectants.
2597. C. Tusnot, 121, Chaussée de Waterloo, St. Gilles-lez-Bruxelles—Certain imp. in the manufacture of cartridge bottoms or entire cartridges composed entirely of the same elements.
2600. J. Mitchell, Dyke Head, Lanark, N.B.—Imp. in sinking, quarrying, and excavating in the earth.
2601. C. Parker, Dundee—Imp. in machinery or apparatus for winding yarns or threads.
2605. C. J. Pownall, Jermyn-street, Westminster—Imp. in preparing and cleansing vegetable fibres, and in the machinery employed therein.
2606. W. W. Burdon, Newcastle-upon-Tyne—Imp. in reducing and preparing wood for the manufacture of paper and pulp.
2607. R. A. Brooman, 166, Fleet-street—A new material for tanning. (A com.)
2608. H. Bridson and J. Alcock, Bolton—Imp. in machinery for plaiting or folding fabrics.
2609. T. Dickins, A. L. Dickins, and H. Heywood, Middleton, Lancashire—Imp. in dyeing threads of silk.
1610. A. Turner, Leicester—Imp. in looms for weaving.

Dated 23rd October, 1863.

2613. M. A. Boyle, Claremont-house, Holland-street, Kensington—Imp. in portable writing cases and despatch boxes.
2615. J. Claes, 18, Rue de l'Echiquier, Paris—An improved apparatus for regulating the emission of gas. (A com.)
2616. J. T. Webster, Mansfield, Nottinghamshire—Imp. in driving the spindles of doubling and spinning frames.
2618. V. J. Cassaignes, 35, Rue de Rivoli, Paris—Imp. in the manufacture of the prisms, lenses, and glasses of stereoscopes, and in ornamenting glass.
2620. J. Parker, 6, Lilford-road, Camberwell—Imp. in the application of steam combined with air as a motive power, and for other purposes.
2621. A. V. Newton, 66, Chancery-lane—An improved mode of manufacturing railway wheels. (A com.)

Dated 24th October, 1863.

2623. W. Betts, Wharf-road, City-road—Imp. in the manufacture of metallic capsules for bottles and similar vessels, and in the apparatus or means for applying or fixing such capsules thereon.
2624. E. S. Crease, Tavistock, Devonshire—Imp. in machinery for drilling, boring, or excavating rock or other earthy substances.
2625. J. Davidson, Leek, Staffordshire—Imp. in doubling yarns or threads of silk and other fibrous substances, and in the machinery employed therein.
2626. J. Thomas, 5A, Great Bolton-street, Kennington-park—Imp. in gas meter indicators.
2627. G. Haseltine, 12, Southampton-buildings, Chancery-lane—A new attachment to coverings for the head, and to other articles of dress, for lighting matches. (A com.)
2628. F. B. Baker, Sherwood-street, Nottingham—Imp. in apparatus used in dressing lace and other textile fabrics, and suitable also to the application of dyes or colouring matters thereto.
2629. J. Brown, 27, Aldgate, and J. T. Way and T. M. Evans, 106, Leadenhall-street—Imp. in preparing cements and varnishes.

2631. L. J. Hannart, Brussels, Belgium—An improved clasp or fastening for gloves or other wearing apparel, for umbrellas, travel ling bags, or other similar objects.
2633. A. Sellar, Market-place, Reading—An improved instrument for lubricating rifles and other descriptions of fire-arms, also ordnance.
2635. A. Alison, 72, Sloane-street, Chelsea—Imp. in atmospheric railways, and in carriages for the same.

Dated 26th October, 1863.

2637. B. Steinmetz, 12, Newgate-street—Imp. in locks for bags.
2639. T. Marsh, Sheffield—Imp. in projectiles.
2641. M. Vian, Marseilles—Certain compositions for preserving iron ships and other submerged iron work from corrosion and decay.
2643. W. E. Gedge, 11, Wellington-street, Strand—An improved pillow. (A com.)
2645. J. Willcox, 1, Ludgate-hill—Imp. in sewing machines. (A com.)
2647. E. Clifton and B. Greenwood, Southfield-square, Manningham, Yorkshire—Imp. in the manufacture of brushes used in machinery employed in preparing and combing wool, cotton, silk, and other fibrous substances.

Dated 27th October, 1863.

2649. T. H. Holderness, Liverpool—Imp. in propelling navigable vessels.
2651. T. Grason, Manchester—Certain imp. in boots, shoes, clogs, and such like coverings for the feet.
2653. W. Livingstone, 51, Glengall-road, Poplar—An improved machine for punching, shearing, and rivetting metals.
2655. P. B. O'Neil, Warwick-street, Regent-street—An improved salinometer which is applicable also as a hydrometer, and for other similar or analogous purposes.
2657. E. R. Hollands, 16, Charles-street, Northampton-square—Imp. in machinery for punching, cutting, and pressing metals and other materials.
2659. W. Firth, Burley, near Leeds, S. Firth and J. Sturgeon, Leeds—Imp. in machinery for cutting and boring coal, stone, or other minerals.

Dated 28th October, 1863.

2661. J. Marshall, Stockport—Certain imp. in apparatus for applying adhesive substances to spindles employed in spinning cotton and other fibrous materials and for the lubrication thereof.
2667. R. Needham, Dukinfield, Cheshire, and J. Pollitt, Heywood, Lancashire—Improved equilibrium valves for steam engines and other purposes.
2669. M. Henry, 84, Fleet-street—An improvement in, or addition to, military knapsacks, travelling bags, and other similar articles. (A com.)
2675. R. A. Brooman, 166, Fleet-street—Imp. in clocks, watches, and other timekeepers. (A com.)

Invention with Complete Specification Filed.

2663. W. E. Gedge, 11, Wellington-street, Strand—An improved system of permanent advertisement. (A com.)—28th October, 1863.

Patents Sealed.

[From Gazette, November 6th, 1863.]

6th November.

1177. B. Hargreaves.
1178. R. Burgess.
1183. R. A. Brooman.
1186. J. E. McConnell and G. H. Bovill.
1191. J. E. McConnell and G. H. Bovill.
1192. W. Whiteley.
1210. T. Lawrence.
1241. W. Watson.
1248. C. Barnard, J. Bishop, C. Barnard, jun., and G. Barnard.
1270. W. Walker.
1272. W. Nunn.
1280. J. Goodman.
1293. E. Barlow, J. Ashworth, jun., J. Newhouse, F. Hamilton, and W. Hope.
1309. H. A. Bonneville.
2087. L. E. C. Martin.
2132. H. W. Putnam.
2144. L. E. C. Martin.

[From Gazette, November 10th, 1863.]

10th November.

1189. T. Warren.
1195. R. A. Brooman.
1197. R. A. Brooman.
1199. R. A. Brooman.
1203. J. E. McConnell and G. H. Bovill.
1208. J. Farmer.
1209. R. A. Brooman.
1212. A. Pilbeam.
1219. I. Parker
1220. B. Shillito and D. Moor.
1222. D. M. Fyfe.
1224. A. Macmillan.
1225. R. T. Mallet.
1226. J. Patterson.
1229. B. Browne.
1232. F. M. Burns.
1235. J. Gibbs.
1236. W. White.
1238. E. B. Wilson.
1239. J. Whitehead.
1269. G. R. Harding.
1275. N. J. Amies.
1277. W. H. Clapp.
1278. E. Sonstadt.
1306. J. Hesford.
1307. W. Muir.
1320. W. Clark.
1326. F. W. Kitson and J. Kitson, jun.
1332. H. J. Kennard.
1341. C. F. Baxter.
1362. W. Clark.
1431. C. Nicquet.
1485. J. S. Benson and D. Jones.
1499. W. Clark.
1522. A. Samuelson.
1899. A. R. Arrott.
2128. J. Alison.
2142. A. Rowand.
2188. G. Hargreaves.
2239. T. J. Sloan.

Patents on which the Stamp Duty of £50 has been Paid.

[From Gazette, November 10th, 1863.]

2nd November.

2883. R. Harrison and G. Taylor.

3rd November.

2763. W. Spence.
2788. R. W. Waithman and J. Waithman.
2815. J. Stockley.

4th November.

2725. C. Asprey.
2728. J. Higgins and T. S. Whitworth.

5th November.

2800. J. Crooke.

6th November.

2742. A. J. Sedley.
2826. G. Glover.

7th November.

2760. J. W. Wallis.

Patents on which the Stamp Duty of £100 has been Paid.

[From Gazette, November 10th, 1863.]

2nd November.

2585. H. Bessemer.
2593. W. Weild.
2639. H. Bessemer.

4th November.

2596. C. Titterton.

7th November.

2642. F. J. Manceaux and E. N. Vieillard.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4590	Nov. 2.	An Improved Wine Bin or Bottle Case......	Wm. Newzam Nicholson	The Trent Iron Works, Newark.
4591	,, 4.	Self-heating Box-iron ...	Wm. Leggatt Gilbart and Co.	Birmingham.
4592	,, 6.	A Ladies' Portmanteau...	Harriet Jane Cave ...	1, Edward-street, Portman-square.
4593	,, 7.	A Corrugated Ventilating Hat Anti-Macassar Pad ...	S. and T. Carrington ...	Stockport, Chester.
4594	,, 9.	Joint of Breech-loading Fire-arms	Henry Elliott ...	Birmingham.
4595	,, ,,	The Salamanca Portmanteau Dressing Bag.	Mechi and Bazin ...	112, Regent-street.

LIST OF PRESENTS.

The following presents have been made to the Society during the past year. The thanks of the Society have been forwarded to the donors:—

Presents.	Donors.
Bust of His Royal Highness the Prince of Wales	Morton Edwards.
Model of the Ulverston Iron Works, exhibited in the International Exhibition, 1862	Messrs. Hannay & Co.
Case of Specimens of Arsenic, exhibited in the International Exhibition, 1862	James Scales.
Models of an Improved Hospital Bed and Stretcher, exhibited in the International Exhibition, 1862	Capt. G. Russell.
Specifications of Patents up to the present time, and Indexes	Commissioners of Patents.
Abridgment of ditto	"
Commissioners of Patents' Journal.	"
A Dictionary of Chemistry, by Henry Watts, B.A., F.C.S. Parts 1–7 (in continuation)	Messrs. Longman, Green, and Co.
Proceedings of the Scottish Shipbuilders' Association. Session 1862–63	Association.
La Coltivazione del Cotone in Italia. Parts 1–14	Publishers.
Proceedings of the Royal Institution of Great Britain. Vol. iv. Parts 1 and 2	Institution.
Journal of the Geological Society of Dublin, 1862–63	Society.
Proceedings of the Linnæan Society. Vol. vii. Nos. 25–27	"
Transactions of ditto. Vol. xxiv. Part I	"
Journal of the Royal Asiatic Society. Vol. xx. Part 2	"
Proceedings of the Royal Geographical Society. Vol. vii. 1–5	"
Proceedings of the Royal Society. Nos. 52–57	"
Journal of the Statistical and Social Inquiry Society of Ireland. Nos. 20–24	"
Journal of the Royal Agricultural Society. Vol. xxiv. Part 1	"
Proceedings of the Institution of Mechanical Engineers. 1863	Institution.
American Journal of Science and Art.	B. Silliman.
Canadian Journal of Industry, Science, and Art	Canadian Inst.
Records of the Salop Infirmary, from the commencement of the charity up to the present time, being a period of 100 years, by Henry Bevan, M.D., Secretary	Author.
Ausstellung von Schul-und Unterrichts-Gegenständen	Austrian Government.
Linear Perspective Simplified, by John Holt	Author.
Proceedings of the Literary and Philosophical Society of Liverpool, twenty-first session, 1861-62, No. xvi	Society.
Lands of Tasmania, compiled from the Official Records of the Survey department, by J. E. Calder, Surveyor General	Author.
Smithsonian Report for 1860 Catalogue of Publications of the Smithsonian Institution	Smithsonian Institution.
Results of Meteorological Observations under the direction of the Smithsonian Institution, 1854-59, Vol. i. Smithsonian Miscellaneous Collections, Vols. i. to iv.	Smithsonian Institution.
Catalogue of the Officers and Students of Harvard University Statutes and Laws of do. do. Annual Reports of Trustees of Museum of Comparative Zoology, 1861-62 Catalogus Universitatis Harvardinae, 1860 Annual Reports of President and Treasurers, 1860-61 Reports of Committees of Overseers appointed to visit the Library, the Observatory, and the Lawrence Scientific School	Harvard University.
Transactions of the American Philosophical Society, Philadelphia, Vol. xii, parts 1, 2, 3	Society.
Proceedings of ditto, Vol. vii., No. 64, Vol. viii., Nos. 65, 66, Vol. ix., No. 67	"
Memoirs of American Academy of Arts and Sciences, Boston, Vol. viii., part 1 and 2	Academy.
Proceedings of ditto, 1860-62	"
Transactions of the New York State Agricultural Society, 1860	Society.
Ditto ditto 1861	"
Marques de Fabrique et Noms Commerciaux	M. Henry.
Catalogue of the Russian Section, International Exhibition of 1862	Russian Commissioner.
Do. do. of the Zollverein section Do. do. of the Mining and Metallurgical Products, Class I., in Zollverein Department of International Exhibition, 1862	Zollverein Commissioner.
Catalogues and Circulars of the Danish Department of the International Exhibition, 1862	A. Westenholz, Commissioner for Denmark.
Report of the Society of Arts, Vienna, 1859, 1860, 1861	Chev. de Schwarz.
Industrie Statistik der Oesterreichischen Monarchie, 1856, 1857, 1858	Baron C. Czoernig.
Das Oesterreichische Budget, für 1862, parts 1 to 5	"
Notices at the Proceedings at the Meetings of the Members of the Royal Institution of Great Britain, vol. xii., 1861-62	Institution.
Essays on Dwellings of the Poor, and other subjects, by Rufus Usher (17 copies)	Author.
A Catalogue of the Marine Algæ of Plymouth, by J. Boswarva	"
Third Annual Report of the South Staffordshire Association for the Promotion of Adult Education and Evening Schools	Association.
Mineral Resources of Central Italy, by W. P. Jervis, F.G.S.	Author.

Presents.	Donors.
On the Cultivation of Cotton in Italy, by G. Devincenzi	Author.
Report of the Royal Italian Commission on the International Exhibition, 1862	Commission.
Transactions of the Royal Society of Victoria, 1860	Society.
Minutes of Proceedings of the Institute of Civil Engineers, Vol. xx., 1860-61	Institution.
Reports of the Inspectors of Factories for the half-years ending 31st Oct., 1862, and 30th April, 1863.........	Alex. Redgrave.
Cook, on Wheel and Wheel Carriages....................................	Author.
Hunt, on Stammering	"
Transactions of the Historic Society of Lancashire and Cheshire. Session 1861-62	Society.
Willich's Popular Tables................	Author.
Report on some of the Machinery exhibited at the International Exhibition of 1862, by Peter Rittinger....................................	Chev. de Schwarz.
Memoirs of the Geological Survey of India, Vol. iv., part 1	Geological Survey.
Do. do. (Palæontologica Indica), parts 1 and 2, series 2	"
Annual Report of do., 1861-62	"
Holmes's Magneto-Electric Light as applicable to Lighthouses	W. H. Cutler.
Indexes to the Public Library, Boston, U.S.	H. T. Parker.
Tenth Annual Report of the Trustees of do...	"
Complete Set of Circulars and Documents issued by H.M. Commissioners for 1862	Her Majesty's Commissioners.
A few Particulars relative to the Colony of Victoria, by J. G. Knight, F.R.I.B.A................................	Author.
Proceedings of the "Congrès International de Bienfaisance," Londres, 1862	Henry Roberts.
Transactions of the American Institute, New York, 1855, 1856, 1858, 1859, 1860, 1861	Institute.
Proceedings of the Zoological Society, 1861, part 3; 1862, parts 1, 2, 3..	Society.
Transactions of do., Vol. iv., part 7; Vol. v, parts 1, 2	"
Archæologia, or Miscellaneous Tracts relating to Antiquity, Vol. xxxix., part 1	Society of Antiquaries.
Japanese Art. Lecture delivered at the Royal Inst. of Great Britain, May 1, 1863, by John Leighton, F.S.A.	Author.
A few Observations upon the Works of the Isthmus of Suez Canal, made during a visit in April, 1863, by Benjamin Oliveira, F.R.S.	"
Report of the Secretary of the Navy at Washington, 1862	Department of the Navy.
American Patent Office Report, 1862, Mechanics, Vol. 1 and 2	U.S. Patent Office.
British Association for the Advancement of Science. Report of the meeting at Cambridge, 1862	Dr. J. Phillips, M.A., F.R.S.
Bhore Ghaut Incline of the Great Indian Peninsula Railway. A Paper read at the Bombay Mechanics' Institute, by J. J. Berkley, Esq., President, with an Appendix by A. A. West, Esq., C.E..........	Walter West, C.E.
The Dwellings of the Labouring Classes, 3rd edition, with an Appendix, by Henry Roberts, Esq., F.S.A.	Society for the Improvement of the Dwellings of the Labouring Classes.
Healthy Moral Homes for Agricultural Labourers, by P. Thompson, Esq.	Author.
New York in the American Revolution. A Collection of Original Papers from the MSS. of the Mercantile Library Association, New York	Association.
Course and Current of Architecture, by Samuel Huggins, Architect ...	Author.
Statistical Register of South Australia	G. S. Walters.

CONTRIBUTIONS TO THE READING ROOM.

The Council beg to acknowledge, with thanks to the proprietors, the regular receipt of the following journals and periodicals :—

WEEKLY.

Agricultural Review.
Athenæum.
Builder.
Building News.
Chemical News.
Cosmos.
Critic.
Engineer.
Gardeners' Chronicle.
Les Mondes.
London Review.
Mechanics' Magazine.
Mining Journal.
North British Agriculturist.
Photographic News.
Reader.
Social Science Review.

FORTNIGHTLY.

British Journal of Photography.
Canadian News.
Cotton Supply Reporter.

MONTHLY.

Annals of British Legislation.
Artizan.
Bulletin de la Société d'Encouragement pour l'Industrie Nationale.
Bulletin du Musée de l'Industrie.
Canadian Naturalist and Geologist.
Civil Engineer and Architects' Journal.
Educational Times.
Engineer's Journal (Calcutta).
Geologist.
Intellectual Observer.
Journal of the Board of Arts and Manufactures for Upper Canada.
Journal of the Chemical Society.
Journal of the Franklin Institute.
Journal of the Horticultural Society.
Journal of the National Life Boat Institution.
Journal of the Pharmaceutical Society.
La Science Industrielle.
London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science.
Mining and Smelting Magazine.
Newton's London Journal of the Arts and Sciences.
Photographic Journal.
Practical Mechanics' Journal
Presse Scientifique des Deux Mondes.
Technologist.
The Horological Journal.
The Institute and Lecturers' Gazette.
Veterinarian.

QUARTERLY.

Journal of Mental Science.
Journal of the Geological Society.
Journal of the Royal Dublin Society.
Journal of the Royal United Service Institution.
Journal of the Statistical Society.
Popular Science Review.

INDEX TO VOLUME XI.

* *disc.*, discussion at a meeting.

ERRATA.

In page 14, col. 1, line 13, for "100 millions" read "1,000 millons," and line 15, for "30 millions" read "300 millions."
In page 98, col. 1, line 4, for "prohibited" read "protected."
In page 151, col. 1, line 13 from bottom, before "awards" insert "no."
In page 432, col. 2, line 4 *et seq.* from bottom, for "Mr. Robinson had fully recognised the desire of the native community to avail themselves of the benefits of education," read "Mr. Robinson had fully recognised the desire of the Europeans to afford to the native community the benefits of education."
In page 536, col. 1, line 19, before "be abolished" insert "not."

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